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ABSTRACT

This study investigated relationships between community college student characteristics, student enrollment and registration behaviors, and academic outcomes. The study examined five student characteristic variables: student age, gender, ethnicity, academic intent, and financial aid eligibility; four enrollment and registration variables: when students initially enroll and how many, what types of, and when changes were made to student course schedules; and three academic outcome variables: GPA, course completion, and attrition. Five research questions were investigated: (1) if relationships between enrollment and registration behaviors and student characteristics exist; (2) if interrelationships among the enrollment and registration behaviors exist; (3) if interrelationships among the academic outcomes exist; (4) whether enrollment and registration behaviors predict student academic outcomes; and (5) whether, while controlling for student characteristics, enrollment and registration behaviors predict student academic outcomes. The results indicate that while controlling for student characteristics, number of course drops and adds, when schedule changes were made, and when a student initially enrolled could predict 34% of variance in fall semester GPA beyond the 6.5% explained by student characteristics, and 44% of variance in semester course completion could be predicted beyond the 8.6% explained by student characteristics. (Contains 43 tables, 2 figures, and 142 references.) (KP)

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ENROLLMENT AND REGISTRATION BEHAVIORS AS PREDICTORS OF ACADEMIC OUTCOMES FOR FULL-TIME STUDENTS IN A RURAL COMMUNITY COLLEGE

BY

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THESIS

Submitted in partial fulfillment of the requirements
for the degree of Doctor of Education in Education
in the Graduate College of the
University of Illinois at Urbana-Champaign, 2000

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ABSTRACT

This study investigated the relationships between community college student characteristics, student enrollment and registration behaviors, and academic outcomes. The study also examined if enrollment and registration behaviors could predict student academic outcomes. Five student characteristic variables investigated were student age, gender, ethnicity, academic intent, and financial aid eligibility. The enrollment and registration variables studied were: (a) when students initially enroll, (b) how many changes were made to their course schedule, (c) what types of changes were made to the course schedule, and (d) when the changes were made to the course schedule. The academic outcomes variables investigated were: fall semester grade point average, fall semester course completion, and attrition (whether the student enrolled for the spring semester).

The sample for this study consisted of all first-time full-time college students pursuing a certificate or degree program at one small rural community college in the Midwest. The sample for this study was comprised of three cohorts of students who enrolled in the fall semester of 1994, the fall semester of 1995, or the fall semester of 1996 ($\underline{n}$ = 1,365).

Utilizing a variety of statistical tests and both multiple linear regression and logistic regression, five research questions were investigated. Research question one focused on the relationships between enrollment and registration behaviors and student characteristics. This study found that when students initially enrolled was related student age, gender, ethnicity, academic intent, and financial aid eligibility. Also found was that number of course drops was related to ethnicity, number of course adds was related to academic intent, and number of course section changes was related to gender. Last, when changes were made to the schedule was found to be related to student gender, ethnicity, and financial aid status.

Research question two examined if there were interrelationships among the enrollment and registration behaviors explored in this study. Research question three examined if there were interrelationships among the three academic outcomes. Several statistically significant relationships were found among both of these sets of variables.

Research question four investigated whether enrollment and registration behaviors could predict student academic outcomes. Overall, the findings indicated that a combination of number of course drops, course adds, when schedule changes were made, and when a student initially enrolled could predict 37.6% of variation in semester GPA and 48.6% of variation in semester course completion. Except for when changes were made to the schedule, these same behaviors could predict the odds of attrition.

Finally, research question five investigated whether, while controlling for student characteristics, enrollment and registration behaviors could predict student academic outcomes. The results indicated that while controlling for student characteristics, a combination of number of course drops, course adds, when schedule changes were made, and when a student initially enrolled could predict 33.9% of the variance in fall semester GPA beyond the 6.5% explained by a combination of five student characteristics. Further, 43.9% of the variance in semester course completion could be predicted by the same combination of behaviors beyond the 8.6% explained by the five student characteristics. Last, except for when changes were made to the schedule, these same behaviors could significantly predict the odds of attrition beyond what student characteristics could predict.

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CHAPTER 1

INTRODUCTION

Since their inception, American community colleges have shared a common interest and commitment to helping students achieve a variety of educational and career goals (Bogue, 1950; Cohen & Brawer, 1987, 1989, 1996; Diekhoff, 1950; Eells, 1931; Frye, 1992; Monroe, 1972; O'Connell, 1968; Thorton, 1960). Meeting this responsibility effectively requires that community colleges understand both how their students learn while enrolled and how these institutions influence student development and learning (Campbell, 1985; Cohen, 1969; Deegan & Tillery, 1985; Knox, Lindsay & Kolb, 1993; Miller, 1984; Roe, 1989). Community colleges are also responsible for meeting increased demands from state legislators and governing boards to address a number of challenges, including becoming more accountable for meeting their institutional goals and objectives (Nettles, 1995; Rahn & Holmes, 1999). Among these various goals, a high attrition rate for students has become an increasing problem over the past decade (American Association of Community Colleges, 1994; Brawer, 1996). A more in-depth understanding of community college students in relation to the attrition process is necessary to develop initiatives that can reduce the attrition rate (Conklin, 1997; Dietsche, 1995; Opp & Colby, 1986). A set of data that is rarely utilized in attrition research needs to be considered because of its potential for improving our understanding of student attrition. These data are referred to as student enrollment and registration behavior.

Presently, researchers analyze a variety of student characteristics such as age, gender, race, enrollment status, residence, educational goals, and many others in an effort to identify students who are at risk of dropping out of college (Grimes & Antworth, 1996; Nelson, Scott & Byran, 1984; Pascarella & Terenzini, 1980; Tharp, 1998). Several researchers have also included the investigation of ability, ACT scores, socioeconomic status, high school grades, high school program, and educational aspirations to determine their collective and individual association with variation in retention for community college students (Fischbach, 1990; Gates & Creamer, 1984; Terenzini & Pascarella, 1978).

The identification of students likely to drop out allows for the delivery of intervention services prior to withdrawal with the expectation of reversing the dropout decision (Dietsche, 1995; Pantages & Creedon, 1978; Upcraft & Gardner, 1989; Webb, 1989). Some researchers contended "it is far better to counter the paths of attrition with the early recognition of dropout-prone individuals. The behavior patterns of at-risk freshmen are observable, once we know what to look for" (Levitz & Noel, 1989, p. 70). Further, Kowalski (1977) referred to intervention as serving "potential dropouts before they become dropouts" (p. 78).

In several cases, early intervention has proven to be successful at helping to influence students to remain in college (Bishop & Brenneman, 1986; Bishop & Walker, 1990; Cangemi, 1979; Noel, Levitz, & Saluri, 1985; Stork & Berger, 1978). Several researchers found that a large majority of the students that were considered likely candidates for attrition chose to continue in college after receiving counseling (Bishop & Brenneman, 1986). Others found that there was significant evidence that "students who are identified as retention risks tend to persist in their academic careers after receiving counseling" (Bishop & Walker, 1990, p. 89). However, despite many investigations conducted on student characteristics and academic variables such as study time, credit hour load, and grade point average, research has yielded mixed results in terms of the relationship of these variables to attrition (Aquino, 1990; Brawer, 1996; Jones, 1986).

Statement of the Problem

Community college student attrition continues to receive a great deal of attention from researchers, practitioners, and policymakers in higher education (Alfred, 1974; Pascarella, 1982; Roueche & Roueche, 1994; Tinto, 1987, 1993). Some attribute this interest to a nationwide demand for institutional assessment and accountability (American Association of Community Colleges, 1994; Aquino, 1990; Cohen & Brawer, 1996). The high costs associated with student attrition justify and demand the continued search for methods of reducing the rate of attrition of community college students (Conklin, 1997; Dietsche, 1995; Hatcher, Kryter, Prus, & Fitzgerald, 1992).

Much attrition research has focused on the characteristics and variables associated with students in an attempt to discover relationships and associations between them and attrition (Brawer, 1996; Nelson, Scott, & Byron, 1984). Related to attrition, researchers have investigated student retention, persistence, and dropout as essentially the same collective phenomenon. Studies have explored the relationships between student characteristics and retention and have found mixed results (Gates & Creamer, 1984; Tharp, 1998). Other researchers have examined the relationship of academic factors such as high school performance, placement test scores, and remediation status with persistence and have found non-significant relationships (Brooks-Leonard, 1991; Feldman, 1993; Fischbach, 1990; Hardin, 1990). These conflicting results have led researchers to acknowledge that student attrition is a complex phenomenon unlikely to have simple solutions (DeVecchio, 1972; Jones, 1986; Levitz & Noel, 1980).

Within an environment where greater numbers of students enrolling in community colleges are in need of increased levels of support, institutions need to find solutions and strategies for reducing student attrition and increasing student success (Roueche & Roueche, 1994). More research on community college student behavior is needed to better understand the influences and predictors of student attrition and subsequently the strategies that may influence its reduction. The results of this research, when applied as part of a comprehensive institutional system of identification, intervention, and implementation has the potential for contributing to the reduction of the attrition rate of community college students (Grimes & Antworth, 1996; Jones, 1982). The investigation of community college student enrollment and registration behaviors may provide valuable additional data for understanding and identifying students likely to dropout and facilitating methods for reducing the number of dropouts.

Purpose of the Study

The inclusion of information about student enrollment and registration behaviors has the potential for more accurate identification of students prone to dropout. Levitz and Noel (1980) claim that "attrition is the result of an extremely intricate interaction among a large number of variables, not just academics. Consequently, attempts to isolate single causal factors are often misguided and ultimately futile" (p. 15). Research on enrollment and registration behaviors thus far has largely focused on the investigation of late registrants and their academic achievement as compared to regular registrants (Angelo, 1990; Diekhoff, 1992; Mannan & Preusz, 1976; Peterson, 1986).

This study examined the enrollment and registration behavior of three cohorts of first-time, full-time community college students at one rural public community college. The study first explored a set of student characteristics that include age, gender, ethnicity, academic intent, and financial aid eligibility to determine the relationship of these variables to a set of student enrollment and registration behaviors. Second, behaviors of the students were analyzed to determine if enrollment and registration behaviors could predict fall semester grade point average (GPA), fall semester course completion, and attrition. Third, while controlling for student characteristics, enrollment and registration behaviors were investigated to determine their ability to predict fall semester GPA, fall semester course completion, and attrition.

The examination and analysis of college student enrollment and registration behaviors provided additional data for understanding student demographics and activities associated with enrollment at a community college. The attrition rate for community college students can potentially be reduced through the use of student enrollment and registration behavior data in two specific areas. The first of these areas, the early identification of students likely to drop out of college, might be enhanced with additional knowledge of student enrollment and registration behaviors. These new data, when utilized in the identification process, could possibly improve an institution's ability to accurately target with intervention services those students most likely to drop out. The other area where student enrollment and registration data may potentially lower the attrition rate is related to the policies and procedures of the institution. Enrollment and registration behavior data—when utilized as part of decision-making for improving matriculation processes at the institution—might have a positive impact on student attrition.

Research Questions

Listed below are the five research questions that guided the activities related to this study.

(1) What are the relationships between student characteristics and enrollment and registration behaviors?

(2) What are the interrelationships among enrollment and registration behaviors?

(3) What are the interrelationships among student academic outcomes?

(4) Do student enrollment and registration behaviors predict student academic outcomes?

(5) Controlling for student characteristics, do enrollment and registration behaviors predict student academic outcomes?

Research Hypotheses

Listed below are the specific research hypotheses for this study. The main hypotheses are presented for organizational purposes only and not tested. They are included as a means of grouping sub-hypotheses according to the research questions. All sub-hypotheses are tested utilizing statistical procedures specified in Chapter Three.

First Main Hypothesis

There is no relationship between student characteristics and when students initially enroll for the fall academic semester. Sub-hypotheses include:

Sub-Hypothesis I (a)

There is no relationship between student age and when students initially enroll for the fall academic semester.

Sub-Hypothesis I (b)

There is no relationship between student gender and when students initially enroll for the fall academic semester.

Sub-Hypothesis I (c)

There is no relationship between student ethnicity and when students initially enroll for the fall academic semester.

Sub-Hypothesis I (d)

There is no relationship between student academic intent and when students initially enroll for the fall academic semester.

Sub-Hypothesis I (e)

There is no relationship between student financial aid eligibility and when students initially enroll for the fall academic semester.

Second Main Hypothesis

There is no relationship between student characteristics and the number of changes students make to their fall course schedule. Sub-hypotheses include:

Sub-Hypothesis II (a)

There is no relationship between student age and the number of changes students make to their fall course schedule.

Sub-Hypothesis II (b)

There is no relationship between student gender and the number of changes students make to their fall course schedule.

Sub-Hypothesis II (c)

There is no relationship between student ethnicity and the number of changes students make to their fall course schedule.

Sub-Hypothesis II (d)

There is no relationship between student academic intent and the number of changes students make to their fall course schedule.

Sub-Hypothesis II (e)

There is no relationship between student financial aid eligibility and the number of changes students make to their fall course schedule.

Third Main Hypothesis

There is no relationship between student characteristics and the types of changes students make to their fall course schedule. Sub-hypotheses include:

Sub-Hypothesis III (a)

There is no relationship between student characteristics and the number of course drops students make to their fall course schedule.

(1) There is no relationship between student age and the number of course drops students make to their fall course schedule.

(2) There is no relationship between student gender and the number of course drops students make to their fall course schedule.

(3) There is no relationship between student ethnicity and the number of course drops students make to their fall course schedule.

(4) There is no relationship between student academic intent and the number of course drops students make to their fall course schedule.

(5) There is no relationship between student financial aid eligibility and the number of course drops students make to their fall course schedule.

Sub-Hypothesis III (b)

There is no relationship between student characteristics and the number of course adds students make to their fall course schedule.

(1) There is no relationship between student age and the number of course adds students make to their fall course schedule.

(2) There is no relationship between student gender and the number of course adds students make to their fall course schedule.

(3) There is no relationship between student ethnicity and the number of course adds students make to their fall course schedule.

(4) There is no relationship between student academic intent and the number of course adds students make to their fall course schedule.

(5) There is no relationship between student financial aid eligibility and the number of course adds students make to their fall course schedule.

Sub-Hypothesis III (c)

There is no relationship between student characteristics and the number of course section changes students make to their fall course schedule.

(1) There is no relationship between student age and the number of course section changes students make to their fall course schedule.

(2) There is no relationship between student gender and the number of course section changes students make to their fall course schedule.

(3) There is no relationship between student ethnicity and the number of course section changes students make to their fall course schedule.

(4) There is no relationship between student academic intent and the number of course section changes students make to their fall course schedule.

(5) There is no relationship between student financial aid eligibility and the number of course section changes students make to their fall course schedule.

Fourth Main Hypothesis

There is no relationship between student characteristics and when students make changes to their fall course schedule. Sub-hypotheses include:

Sub-Hypothesis IV (a)

There is no relationship between student age and when students make changes to their fall course schedule.

Sub-Hypothesis IV (b)

There is no relationship between student gender and when students make changes to their fall course schedule.

Sub-Hypothesis IV (c)

There is no relationship between student ethnicity and when students make changes to their fall course schedule.

Sub-Hypothesis IV (d)

There is no relationship between student academic intent and when students make changes to their fall course schedule.

Sub-Hypothesis IV (e)

There is no relationship between student financial aid eligibility and when students make changes to their fall course schedule.

Fifth Main Hypothesis

There is no interrelationship among the enrollment and registration behaviors investigated in this study. In this case, the sub-hypothesis parallels the main hypothesis.

Sub-Hypothesis V

There is no interrelationship among the enrollment and registration behaviors investigated in this study.

Sixth Main Hypothesis

There is no interrelationship among the academic outcomes investigated in this study. Sub-hypotheses include:

Sub-Hypothesis VI (a)

There is no relationship between fall semester grade point average and fall semester course completion.

Sub-Hypothesis VI (b)

There is no relationship between fall semester grade point average and attrition.

Sub-Hypothesis VI (c)

There is no relationship between fall semester course completion and attrition.

Seventh Main Hypothesis

Student enrollment and registration behaviors do not predict student academic outcomes. Sub-hypotheses include:

Sub-Hypothesis VII (a)

Student enrollment and registration behaviors do not predict fall semester grade point average.

Sub-Hypothesis VII (b)

Student enrollment and registration behaviors do not predict fall semester course completion.

Sub-Hypothesis VII (c)

Student enrollment and registration behaviors do not predict attrition.

Eighth Main Hypothesis

Controlling for student characteristics, student enrollment and registration behaviors do not predict student academic outcomes. Sub-hypotheses include:

Sub-Hypothesis VIII (a)

Controlling for student characteristics, enrollment and registration behaviors do not predict fall semester grade point average.

Sub-Hypothesis VIII (b)

Controlling for student characteristics, enrollment and registration behaviors do not predict fall semester course completion.

Sub-Hypothesis VIII (c)

Controlling for student characteristics, enrollment and registration behaviors do not predict attrition.

Significance of the Study

Researchers have directed little attention to the investigation and analysis of college student enrollment and registration behavior. While some research has been conducted on late registrants and their academic success as compared to regular registrants, this is only a small portion of the behaviors examined in the present study (see Morris, 1986; Sova, 1986; Stein, 1984). Moreover, much of the extant research on late registrants was conducted at four-year institutions with large student populations comprised of mostly residential students, aged 17 to 21 years. This study provided new data on community college students related to specific characteristics utilized in the identification of those who were likely to drop out. These enrollment and registration data provided another source of information for determining which students needed to be targeted for intervention services to improve their academic success.

Knowledge of student enrollment and registration behavior could be utilized by community college officials to contribute to the reduction of student attrition by providing services and personnel at the times necessary for students based upon the patterns of behaviors at the institution. In addition, these new data could assist college officials in the development of procedures that assist rather than inhibit students in meeting their goals.

As noted by Zwerling (1980), institutional policies and procedures can impede student progress toward educational and career goals. He argued that "to reduce significantly the staggering attrition at the average community college, it appears necessary to shift the focus from what is wrong with the student to what is wrong with the institution" (p. 56). Indeed, institutional leaders have to make decisions about when registration should begin and end, what and when to schedule counselors and advisors, and how to maximize the limited resources of an institution, and they often lack knowledge of student enrollment and registration behavior to help make these decisions. Several researchers have noted the need for improving some institutional policies and procedures as a strategy to reduce student attrition (Beatty-Guenter, 1994; Conklin, 1997; Dietsche, 1995; Lipetzky, 1991; Lyons, 1991). Areas where institutional changes in regulations could positively impact student attrition include policies on late registration (Coffey, 1976) and withdrawal procedures (Farmer, 1980; Larkin, 1977; Vail, 1966).

Further, it is anticipated that student support, academic affairs, and institutional planning staff members in community colleges that routinely formulate and anticipate enrollment numbers for each academic semester would benefit from understanding more about student enrollment and registration behaviors. Community college leaders should be interested and supportive of decisions based upon the kinds of data analyzed in this study, especially when those decisions lower attrition by aligning policies and procedures related to registration services so that students have a greater opportunity for meeting their goals.

Community college students are also likely to benefit from this study. Institutions that use information about student enrollment and registration behaviors could potentially become more effective in providing appropriate levels of support services, intervention activities, and matriculation procedures. Students at these institutions could be more successful at reaching their academic goals because they have access to necessary support services early in their matriculation history, are able to enroll/register at times associated with positive academic outcomes, and are encouraged to refrain from engaging in enrollment/behaviors likely to be associated with low GPA, course non-completion, or college attrition.

This study introduced a new set of college student behaviors that have received very little attention in the past. Those who study college student characteristics and behaviors could benefit from these additional data by improving the identification of students at risk of dropping out. Further, understanding and anticipating enrollment and registration behaviors of students with various characteristics could assist college personnel in enrollment planning activities, institutional staffing patterns, and other institutional logistical processes related to student enrollment. Finally, this study provided baseline data for both community college practitioners to reference and for the community college scholarly community to build upon. The relationships uncovered in this study could become a source for future investigations by researchers examining similar variables.

Definitions

Academic Intent

Students matriculating at the institution where the study was conducted provided responses in their original written admission application that related to their educational goal(s). The responses provided by the student to the questions on "enrollment objective," "attendance goal," "transfer plans," and "major" were inputted into their master file on the administrative computer system. (Student academic intent was then determined by assigning the 8 values of data field AA611 on screen SIS110 to either O = occupational or T = transfer.)

Academic Outcomes

These were operationalized for this study as student grade point average, course completion rate, and attrition.

Academic Semester

For the institution utilized in the present study, three actual "academic semesters" occur during an academic year (August – July). The fall academic semester begins in mid to late August and ends in mid December; the spring semester begins in mid January and ends in mid May; the summer semester includes two periods: an Inter-term that begins in mid May and ends in early June, and a Regular summer term that begins in early July and ends in late July.

Add-Drop Period

For the institution utilized in the present study, this period begins with the first day of official registration for the fall academic semester and continues up through the Friday before final examinations. Students can drop courses without any required authorization from college staff throughout the add-drop period. Students can add courses and change course sections according to institutional policies up through the start of the semester; once the semester has begun they must get faculty approval to add or change to a section of a course that has already begun.

At-Risk Student

This is defined as a student that is likely to not complete his or her educational goals due to personal or institutional circumstances.

Attrition

This is considered to occur when a student enrolled in one or more semesters on a full-time basis and then did not enroll for the next semester, not having completed an associate degree or certificate program (Bean & Metzner, 1985). For the purposes of the present study, a student who engages in this type of behavior is referred to as a dropout.

Behavior

This was defined as observable events in organisms. Skinner (1953) referred to behavior as a process rather than a thing and as a "difficult subject matter, not because it is inaccessible, but because it is extremely complex" (p. 15). Describing its complexity, Skinner stated, "Behavior is a primary characteristic of living things. We almost identify it with life itself" (p. 45).

Course Completion

This is occurs when a student is awarded a grade of "A," "B," "C," or "D" in their official student record for a course. A student who receives a "F" or "W" is considered not to have successfully completed the course.

Enrollment and Registration Behavior

The set of activities engaged in by a student that includes: (a) speaking with a college official face-to-face or via the telephone resulting in the official enrollment and registration in a course or set of courses for an academic semester; or (b) speaking with a college official face-to-face or via the telephone resulting in the changing of an existing schedule of classes by adding, dropping, or changing the section of a class or set of classes. In addition, an enrollment and registration event is said to occur when a student's information is entered into the college's administrative mainframe computer system.

Ethnicity

According to the available choices for students on the original written application for admission to the college: African American (Non-Hispanic), American Indian or Alaskan Native, Asian or Pacific Islander, Hispanic, Non-Resident Alien, or White (Non-Hispanic).

Financial Aid Eligibility

The Financial Aid Office at the institution studied made this determination based upon information received from the student and federal government. Students applying for financial aid were required to submit to the Financial Aid Office a Free Application for Federal Student Aid (FAFSA) form that details their economic income and financial liability information. According to federal guidelines, students' master computer file is coded as either eligible for financial aid or not eligible.

First Semester of Enrollment

This was defined as the first semester of enrollment activity for a student where the student is officially enrolled in one or more courses at the 10th day of the academic semester (2 weeks).

First-Time Student

This was defined as a student who attends the community college in this study for the first time without any previous record of matriculation at this institution. The student may have a matriculation history at other institutions of higher education, however. This is indicated by the student in a section on the admission application completed by the student prior to initial enrollment and registration.

Full-Time Student

This was defined as a student who enrolls for 12 credit hours or more of degree-credit coursework in a single academic semester.

Grade Point Average (GPA)

This is calculated as two separate indicators; semester grade point average is the numerical calculation for the course grades earned by a student in one semester; cumulative grade point average is the numerical calculation for the course grades earned by a student for all the course grades earned by the student to the date of calculation. The calculations at this institution are based on a 5.0 scale, where "A" = 5, "B" = 4, "C" = 3, "D" = 2, "F" = 1, and "W" = 0.

Initial Enrollment and Registration

This was the first enrollment and registration entry in the administrative computer system for a given academic semester for a student. The computer system indicates the calendar date and time this information is entered into the system.

Occupational Student

This was a student that declares on his or her admission application, and subsequently each semester when they enroll, that their academic intent is to pursue either an Associate in Applied Science degree, a Career Certificate of less than 30 credit hours, or a Career Certificate of 30 or more credit hours.

Persistence

Also referred to as retention, this is the continued enrollment of a student in an educational institution within a specific semester, from fall semester to spring semester, or spring semester to fall semester.

Retention

Also referred to as persistence, this is the continued enrollment of a student within an academic semester, from a fall semester to a spring semester, or from a spring semester to a fall semester.

Semester Grade Point Average

This includes all matriculation activity for one specific semester at the college, excluding course grades transferred in from other higher education institutions.

Subsequent Enrollment and Registration Activity

This is recorded on the institution's mainframe computer system as each instance of a student adding, or dropping a course or courses after the initial enrollment and registration for that particular academic semester.

Transfer Student

A student that declares on his or her admission application—and subsequently each semester when they enroll—that their academic intent is to pursue either an Associate in Arts degree, and Associate in Science degree, or an Associate in Engineering Science.

Limitations of the Study

First, the use of secondary or existing data from student records limited the variables identified for study and the opportunity for a more focused and in-depth qualitative examination. Second, the uniqueness of each community college suggests the use of caution when attempting to generalize the results from this particular study to other institutions. The institution in this study was a public rural community college located in east central Illinois with a full-time equivalent student population of approximately 2,200 students with an average income level consistent with blue-collar, working class, and lower middle-class families. The community served by the college was mostly a non-minority population with an economic base comprised of mostly manufacturing, health care, warehousing, and distribution industries.

CHAPTER 2

REVIEW OF THE LITERATURE

The purpose of the literature review was to investigate extant research conducted on community college student characteristics, enrollment and registration behaviors, and academic outcomes. The research questions in the first chapter defined the focus for this review. The review begins with a presentation of existing research studies that have examined student characteristics in relation to the student academic outcomes that were investigated in the present study. The second section reviews research that explored the relationships between the student outcome variables investigated in this study. The third section reviews the literature on enrollment and registration behavior of college students. Finally, a review of several theoretical models of student academic outcomes is presented, followed by a more detailed description of Bean and Metzner's (1985) conceptual model of nontraditional student attrition.

Throughout this chapter, research studies cited refer to the general concept of student attrition using different terminology. Student persistence and student retention are terms utilized by some researchers, referring to a student's continued enrollment at an institution from one semester to another. Student attrition and student dropout are terms utilized by other researchers, referring to a student's discontinued enrollment from one semester to another. All four terms are referenced throughout this chapter to essentially refer to the same condition: whether or not a student enrolled in courses for the following semester, presuming that the student has not graduated.

Student Characteristics and Their Relation to Academic Outcomes

Many researchers have studied college students and their academic outcomes from a variety of perspectives with the goal of clearly understanding these complex phenomena (Astin, 1978, 1993; Bean and Metzner, 1985; Pantages and Creedon, 1978; Pascarella and Terenzini, 1991; Spady, 1970, 1971; Tinto, 1975, 1987, 1993). This portion of the literature review provides an overview of past research conducted on the student characteristics examined in the present study. Research that has focused on the characteristics of college student age, gender, ethnicity, academic intent, and financial aid eligibility, and their relationship to student academic outcomes, are discussed in the sections that follow.

Age

The majority of researchers synthesizing higher education studies that included college student age and its relationship to academic outcomes found that student age was not a major factor in predicting student attrition (Ewell, 1985; Lenning, Beal, & Sauer, 1980; Pace, 1984; Pantages & Creedon, 1978). However, most research conducted at community colleges reported a positive association between student age and academic outcomes (Brunner, Packwood, & Wilson, 1978; Gorter, 1978; Greer, 1980; Hunter & Sheldon, 1980; Johnson, 1980) although a few researchers failed to note a significant association (DeVecchio, 1972; Pascarella & Chapman, 1983; White, 1972).

Several studies found that younger community college students were less likely to drop out than older students. Gorter (1978), analyzing Mercer County Community College students enrolled in the fall 1977 semester and not returning for the spring 1978 semester, determined that non-returnees were more likely to be age 21-25 years and less likely to be age 18-20 years when compared to the general student population. Brunner, Packwood, and Wilson (1978), analyzing a sample of returning and non-returning Delta Community College students, found that younger students were more likely to return than older students. Greer (1980), studying Clayton Junior College students, found that age was negatively related to persistence for students in the regular academic program and positively related for those in a developmental program. Overall, he found the attrition rate of the older students was higher. Price (1993), investigating Allegheny Community College students, found that younger students tended to persist and students that dropped out tended to be older. Similarly, Windham (1994), in a study of first-time students enrolled in a Florida public community college, found that as student age increased the likelihood of remaining enrolled decreased. Lajubutu and Yang (1998) investigated first-time students at Harford Community College and indirectly looked at student age by reporting the number of years that a student delayed attending college in relation to graduation from high school. They found the success rate of the students eight semesters after initial matriculation was much higher for students who began their college career the semester immediately after high school graduation when compared to those students who delayed their college attendance. Success was defined as graduating with an Associate degree, transferring to a senior institution, or being a sophomore in good standing.

Finding a negative but significant relationship with age, Feldman (1993) studied first-time Niagara County Community College students. Feldman's results indicated that dropout risk was associated with younger students, aged 20-24 years more than students 25 years of age and older.

A few studies were identified that investigated community college students and found that age did not relate to academic outcomes. DeVecchio's (1972) study of Lake Land College students did not find a significant association between age and academic outcomes. In his investigation of first-term freshman, he claimed that prediction of withdrawal based on several student demographic variables that included age remained inaccurate and misleading since combined they contributed only 19% of the variance between returnees and those that withdrew from college. Umoh, Eddy and Spaulding (1995), studying developmental mathematics students at a community college, also found that age did not have a statistically significant relationship with student retention in developmental education classes.

Gender

Comprehensive reviews of college attrition studies have indicated that no significant difference was found in the overall attrition rates of men and women (Pantages & Creedon, 1978; Summerskill, 1962). Consistent with this older research, several more recent studies conducted at community colleges have found no association between gender and academic outcomes. Gates and Creamer (1984), using the National Longitudinal Study of the High School Class of 1972 (NLS-72) database, found that student background characteristics accounted for a very small percentage of the variation in student attrition. In combination with six other student background variables, student gender accounted for only 4.3% of the variation in retention status. Aquino (1990), studying Dallas Consolidated Community College District students from 1986 and 1989, found that gender did not have a significant correlation with persistence. Fralick (1993), studying reasons that students had for leaving school, randomly selected Cuyamaca College students who did not enroll for the spring 1991 semester after enrolling in the fall 1990 semester and found no significant differences on college persistence according to student gender.

Umoh, Eddy, and Spaulding (1995) found that gender was not significantly related to retention in their study of students enrolled in two-year developmental mathematics programs. Okun, Benin, and Brandt-Williams (1996) studied a stratified random sample of students enrolled in an Introduction to Psychology class at a metropolitan community college and found that pre-college variables such as gender did not have a direct effect on attrition. Finally, Wall, Lessie, and Brown (1996) investigated a sample of degree-seeking students and video-course students and found that gender was not related to retention.

However, a few studies have reported positive relationships between gender and attrition, suggesting that the type of institution had differing impacts on attrition for men and women (Demos, 1968; Tinto, 1975). In fact, some researchers have developed separate attrition models for men and women due to the different role men and women have in the environment outside of the community college (Bean, 1980, 1982; Spady, 1971). Peng & Fetters (1978), exploring data drawn from the base year and the first and second follow-ups of the National Longitudinal Study of the High School Class of 1972 (NLS-72), found that female students were more likely to withdraw only in two-year colleges. Voorhees (1987), studying new and continuing students enrolled at a suburban community college, observed that females persisted at a higher rate than males, irrespective of full-time or part-time status. Bonham and Luckie (1993) investigated a sample of non-returnees at Del Mar College and found that a greater percentage of non-returnees were female. Grimes and Antworth (1996), studying non-returning students at Gulf Coast Community College, reported that the presence of other variables such as academic major, enrollment status, employment status, and family responsibilities complicate the effect of gender on student outcomes. However, they cited studies by Anderson and Darkenwald (1979), Doan, Friedman and Teklu (1986), and Robertson (1991) who claimed that historically men persisted at a higher rate than women.

Ethnicity

Two major literature reviews have examined the relationship between student ethnicity and attrition. The first, conducted by Lenning, Beal, and Sauer (1980), found that Black students had a higher attrition rate than white students but a lower rate when high school academic ability was controlled. The other completed by Dunston, Richmond, and House (1983a, 1983b), noted that Blacks had higher attrition rates at predominantly White institutions. However, national studies of two-year college students (Gates & Creamer, 1984; Peng & Fetters, 1978) found that when past academic achievement and socioeconomic status were controlled, the relationship between ethnicity and attrition was mixed.

Using the database from the NLS-72, these studies found no significant difference between attrition rates of Black and White students at two-year colleges. Nevertheless, White students were more likely than Black students to withdraw when other variables were controlled. Gates and Creamer (1984), discussed earlier in this review, found that altogether six characteristics and student race accounted for only 4.3% of the variation in retention status, meaning 96% of the variation in retention status came from variables other than student characteristics. Findings from other researchers noted similar relationships between student ethnicity and attrition in higher education (Kohen, Nestel & Karmas, 1978; Terenzini & Pascarella, 1978).

Research conducted at community colleges consistently found very little or no relationship between ethnicity and attrition. DeVecchio (1972), in an older study discussed earlier, maintained that prediction of withdrawal based on student demographic variables remains inaccurate and misleading since combined they contribute only 19% of the variance in persistence. Brunner, Packwood, and Wilson (1978), also discussed earlier, found that ethnic status was not related to attrition. Aquino (1990), Bonham and Luckie (1993), Fralick (1993), Okun, Benin, and Brandt-Williams (1996), and Wall, Lessie, and Brown (1996) all found in their respective studies of community college students, that ethnicity was not related to retention. Further, Voorhees (1985) suggested that there was no significant difference in attrition rates between minority students and Whites when other factors, such as academic ability and socioeconomic status, were controlled. In a later study, Voorhees (1987) found a non-significant association between minority status and persistence. Finally, Grosset (1989), investigating students at the Community College of Philadelphia, found retention patterns that revealed 6% of White students likely to graduate in two years, compared to 2.2% of Black students, 1.5% of Asians, and 1.4% of Hispanics. These alarmingly small percentages suggested modest differences in actual numbers of graduates by ethnicity.

Academic Intent

Alfred (1973), Behrendt (1974), Brainard (1973), Brunner, Packwood, and Wilson (1978), and Walleri (1981) have found that community college students not seeking a degree have high attrition levels as compared to degree-seeking students. Consequently, Alfred (1973) suggested that students with short-term (non-degree) educational goals should be studied as a separate subgroup in attrition research.

Brunner, Packwood, and Wilson (1978), discussed earlier, found that students whose fall goal was to complete a degree or certificate tended to return for the winter semester at a rate of

82%; students with other goals had only a 54% return rate. Only 29% of those returning students changed their goals between fall and winter, while 55% of those students not returning changed their goals. Okun, Weir, Richards, and Benin (1990), discussed earlier in this review, examined whether credit load moderated the intent-turnover relation among community college students. They found that intent accounted for only 3% of the variance in community college student turnover as compared to 38% as reported by Bean (1983).

Brooks-Leonard (1991), studying Indiana Vocational Technical College student records, determined that educational objective and full-time or part-time status were found to differentiate between those students seeking degrees and those just taking courses. Degree-seekers had retention rates of 64- 78%; students just taking courses had a retention rate of 32%. Approximately 43% of part-time students returned, 80% of full-time students returned. Finally, Bonham and Luckie (1993) discussed earlier, compared non-returnees (21.9%) with the entire student body in terms of academic major and found approximately 40% of non-returnees had declared an academic major, 40% had declared vocational majors, but only 20% had not declared a major.

Financial Aid Eligibility

Several studies on college students have sought to determine the impact of student socioeconomic status (SES) on academic outcomes. Bean and Metzner (1985) reported that a large number of studies at community colleges had substantiated the claim that students' reports of financial difficulty were positively related to attrition from college. However, there are a few studies conducted on community college students that found no association between student SES and attrition.

Financial aid eligibility is frequently used as a proxy for SES. Peng and Fetters (1977), in their study of the process of withdrawal from two- and four-year colleges, examined data from the base year and the first and second follow-up studies of the NLS-72. Results indicated that financial aid did not have a significant effect on college persistence. However, Gates and Creamer (1984), discussed earlier, also studied records from the NLS-72 and found that students with higher SES were more likely to persist.

Studies conducted at individual institutions resulted in mostly consistent findings. Wetzel (1977) investigated non-returning students at Delaware County Community College who attended winter 1976 but not the fall 1976 semester to determine the characteristics and reasons for not returning. Student responses to a survey instrument indicated that 69.5% of the non-returning students received no financial aid. Grosset (1989), discussed earlier, found students receiving financial aid were more likely to graduate than those receiving no aid but they were also more likely to be dismissed for academic reasons. However, Aquino (1990), discussed earlier, studied a cohort of community college students and found that income did not have a significant correlation with persistence.

Collectively, studies on the relationship of community college student characteristics with academic outcomes have not provided consistent information that enables the clear identification of students likely to drop out. Some research has determined that age can be a predictor of attrition by itself and in combination with other variables (Feldman, 1993; Prince, 1993). However, while some studies have found that older students are less likely to dropout, others have found young students persisting at a higher percentage (Brooks-Leonard, 1991; Windham, 1994). Attrition studies that have examined student gender have found that it does relate when examined by itself but not when other factors are accounted for (Grimes & Antworth, 1996; Voorhees, 1987). Other studies have indicated no significant relationship at all between gender and attrition (Aquino, 1990; Fralick, 1993). Student ethnicity was found to be related to student persistence in Feldman's (1993) study but most other studies have found no significant relationship (Bonham & Luckie, 1993; Wall, Lessie & Brown, 1996). Studies of student academic intent have found that students with degree-seeking goals persist at higher percentages than students without specific goals (Brooks-Leonard, 1991; Walleri, 1981). However, little research has been conducted that compared the academic outcomes of transfer majors and occupational majors. Finally, the study of student financial aid status and its relationship with academic outcomes has also resulted in mixed findings (Grosset, 1989; Wetzel, 1977).

Associations Between Student Academic Outcomes

The present study investigated three specific student academic outcomes: fall semester GPA, fall semester course completion, and attrition. Several research studies have examined the association between these student academic outcomes. The following sections provide an overview of research that has focused upon these variables.

Grade Point Average

Four reviews of the literature (Lenning et al., 1980; Pantages & Creedon, 1978; Summerskill, 1962; Tinto, 1975) concluded that student GPA is strongly negatively related to attrition from college. Significant positive associations between cumulative GPA and persistence at commuter institutions have been reported several times in the literature (Peng & Fetters, 1978;

Voorhees, 1985). Moreover, Astin (1971) found that a student's GPA is more highly correlated with dropping out than any other single variable.

Tinto (1975) argued that grades are the most important factor in the decision to drop out of college and the higher education literature tends to support this claim. Indeed, many studies report that grades (alone or in conjunction with other achievement measures) are a primary factor in retention (Aitken, 1982; Bean, 1985; Munro, 1981; Pantages and Creedon, 1978; Pascarella and Chapman, 1983; Pascarella, Smart, and Ethington, 1986). However, studies focusing upon the relationship between student GPA and attrition at community colleges have resulted in mixed findings.

In terms of non-significant findings, Wetzel (1977) found that 90.1% of non-returning students had never been on academic probation, suggesting adequate GPAs for those students. Miller (1997) investigated students enrolled in liberal arts and sciences courses at Illinois Central College to determine if a lengthy withdraw period for students might be related to higher ability students withdrawing more often to avoid lower grades. Miller posited that it was possible that this phenomenon occurred only when a drop policy existed that gave students the opportunity to drop classes later in the semester. "Faced with a shorter drop period, both the lower ability and the higher ability student might be forced to remain in the course and accept a lower GPA" (p. 51). Miller found that the research did not support the thesis that students with low cumulative GPAs were more likely to withdraw; to the contrary, students with higher GPAs were found to be more likely to withdraw.

Okun, Weir, Richards, and Benin (1990), discussed earlier in this review, examined whether credit load moderated the intent-turnover relation among community college students.

A multivariate analysis of predictors of turnover indicated that GPA was not a significant predictor of attrition among community college students, whereas total hours of homework was a predictor. Umoh, Eddy, and Spaulding (1995), also discussed earlier, studied the relationship between several variables identified through retention research and students enrolled in a two-year developmental mathematics program. Among other findings, student GPA was found to not relate to retention.

However, Windham (1994) identified the relative importance of a selected set of factors to student attrition. Within the demographic and academic attributes recorded (age, race, sex, first term GPA, scores MAPS tests, enrollment in a college preparatory class the first semester, financial aid status), the most important continuous variable (from the student's first term of enrollment) was GPA. A one unit standard deviation change in GPA improved the likelihood of remaining at the college by a factor of 1.40 the first year and 1.30 the second year.

Other research studies also resulted in significant findings. Gorter (1978) found that full-time student dropouts at a community college earned GPAs that were considerably below the average for all full-time students. Fralick (1993) found that most of the negative attrition occurred in students with a GPA of 1.0 or lower. Fralick defined positive attrition as including those non-returning students who made progress toward achieving their goals or successfully completed the classes in which they were enrolled during the current semester. Negative attrition was defined as applying to those students who said that they had not been successful in making progress toward achieving their goals or had not successfully completed their classes.

Wall, Lessie, and Brown (1996) found that academic success, measured by previous semester GPA, was a strong determinant of retention for all semesters, long-term attendance, and graduation. Napoli and Wortman (1996) conducted a meta-analysis on a set of studies that examined the relationship between academic and social integration on persistence among two-year community college students. Among their findings, term-to-term persistence was significantly and directly linked to first-semester GPA. Finally, Lajubutu and Yang (1998) found that among other academic outcomes variables, cumulative GPA was statistically significant and correlated with student success in terms of persistence and completion of goals.

Student Course Completion

Virtually all research conducted on community college student attrition focuses upon "complete attrition," that is, when a student completely drops out of college. Research on student course completion as a predictor of college attrition is rare. Grimes and Antworth (1996) asserted that examining the course completion rate (hours completed divided by hours attempted) as an additional measure of academic success was appropriate because GPA could be a misleading statistic for students who exhibit extensive withdrawals and course retakes.

Bers' study (1997) of student self-perceptions of academic skills, was the only research identified that studied course-taking patterns of community college students to determine if they could predict academic achievement and success. Treated as a measure of student achievement, the percentage of fall semester courses passed was found to be highly correlated with cumulative GPA ($\underline{r} = .657$, $\underline{p} < .05$). Using multiple regression, Bers also found that course completion was associated with gender, two measures of mathematics, and writing placement. Females were found to pass 73% of their courses as compared to males passing 64% of their courses. A student's math placement score had a weak correlation with percentage of fall courses passed ($\underline{R}^2 = .149$, $\underline{p} < .05$) and whether or not the student enrolled in a remedial math course also had a weak correlation with percentage of fall courses passed ($\underline{R}^2 = .126$, $\underline{p} < .05$). Bers' analyses indicated that collectively, only gender and the number of subjects in which remedial work was needed were statistically significant in terms of predicting the percentage of fall semester courses passed. The strength of this prediction, however, was very weak ($\underline{R}^2 = .060$, $\underline{p} < .01$). The only other studies found that examined course dropout rates were those related to late registration. These studies are reviewed in a later section in this chapter.

In summary, research conducted on the relationships between student academic outcomes has mostly been limited to studies of GPA and its relationship to attrition. While the broader field of higher education research has noted a significant relationship between GPA and attrition (Pascarella, Smart, and Ethington, 1986; Tinto, 1975), studies conducted at community colleges have yielded mixed results (Miller, 1997; Napoli & Wortman, 1996; Umoh, Eddy & Spaulding, 1995; Windham, 1994). One study was identified that examined the relationship between course completion and the other academic outcomes. Bers (1997) found a significant correlation between course completion and persistence and an even larger correlation between course completion and GPA.

Student Enrollment and Registration Behavior Research

College student enrollment and registration behavior has been examined by a relatively limited number of researchers. The few studies that have addressed this topic have either focused on college students as late registrants for the purpose of determining their success in relation to regular registrants (Angelo, 1990; Belcher & Patterson, 1990; Bryant, Danley, Fleming & Somers, 1996; Diekhoff, 1992; Peterson, 1986; Sova, 1986) or the research has focused on class schedule changes (adds and drops) made by students (Broadbent, 1975; Moran, Bausili & Kramer, 1995; Morris, 1986). A few studies on student registration behaviors have been conducted providing some information on the variables used in the studies and comparable methods and analysis. In the sections that follow, this research is presented with particular emphasis given to variables studied.

Late Registration Research

Research on late registration in American colleges and universities is extremely limited and the published studies vary a great deal in terms of research quality. The small number of studies is somewhat surprising considering that most public community colleges today advertise themselves as being open door and have fairly liberal registration policies in the spirit of customer service. Nevertheless, the few studies that have been conducted and published typically investigated GPA, course completion, or college attrition by comparing late registrants with regular registrants. The findings from these studies are mixed (Angelo, 1990; Bryant, Danley, Fleming, & Somers, 1996; Diekhoff, 1992; Mannan & Preusz, 1976; Peterson, 1986; Sova, 1986; Stein, 1984). Moreover, some of the studies also examined the characteristics of late registrants and one study was found that explored the reasons students provided for late registration.

On a larger scale that includes four-year institutions, Mannan and Preusz (1976) studied the academic performance of late registrants at the university level and found it was lower than students that registered on time. The study was conducted at an urban university in the Midwest where a random sample of students who were admitted and registered late was compared to a random group of students who were admitted and registered on time. The late registrants were defined as those students who registered six days after the semester began. Mannan and Preusz compared student GPA for the two groups and found that timely registrants earned significantly higher GPAs. They also compared the grade distribution pattern and found the timely registrants with more "A" grades than the late registrants (23% versus 17%), more "B" grades (31% versus 21%), and less "Fs" than the late registrants (6.5% versus 24.1%). Among the hypotheses offered to explain why the late registrants performed so poorly academically, Mannan and Preusz posited (1) the academic potential of the late registrants could be lower than the on time registrants, (2) the students were already behind in the classes by registering late and could never "catch up," and (3) the late registrants never received adequate counseling and general college planning coupled with the fact that many of the courses they needed were already filled which might have forced them into courses they could not handle or were not interested in.

Diekhoff (1992) examined late registrants in an ex post facto study that included 14 years of his Introduction to Psychology classes taught at a four-year liberal arts university. The purpose of the research was not only to compare the academic performance of late and timely registrants in his classes but also to compare the two groups before and after a more restrictive attendance policy was initiated by him. The restrictive attendance policy was in response to an effort at the institution to improve student retention. Diekhoff operationalized this policy by limiting student absences and dropping students who exceeded the limit. Diekhoff examined the number of absences following enrollment, the score on the first exam, course grade, and course attrition. Random samples of late registrants and timely registrants from 50 classes were selected to make two samples of 123 students each. Then, these samples were subdivided into students who attended the class when there was a nonrestrictive attendance policy and students who attended when there was a restrictive attendance policy.

In the analysis of the data, Diekhoff (1992) found that late and timely registrants did not differ in their scores on the first exam and their course grade—both before and after the restrictive attendance policy. He also found that late registrants accumulated more absences than timely registrants except in classes with a restrictive attendance policy. Finally, Diekhoff found that for classes with a nonrestrictive attendance policy, no relation was found between registration and course completion but a significant relation was found for classes with a restrictive attendance policy. Late registrants enrolled in an Introduction to Psychology class with a restrictive attendance policy had a 26.2% likelihood of dropping or being dropped as compared to a 11.5% chance for timely registrants.

A final study of relevance to the literature review of four-year colleges was a study conducted by Bryant, Danley, Fleming, & Somers (1996) at a regional comprehensive university studying late registrants for the spring 1994 semester. Late registrants were defined as those students accepted for admission after the deadline for submitting all necessary documentation for unconditional admission. The sample in this study was 203 students comprised of 97 freshmen, 20 sophomores, 19 juniors, 18 seniors, 22 graduate students, 13 past graduates, and 14 special students. In terms of attrition, of the students who registered late, 15 withdrew by the fifth day of class (7.4%), another 22 students (10.8%) voluntarily withdrew throughout the semester, and a total of 45 students (nearly 25%) had been removed from active status by the last drop day of the semester. This compares to university-wide attrition rates of 50% freshman to sophomore, 53% sophomore to junior, 32% junior to senior, and 29% senior to graduation. Overall these findings indicated that the late registrants did not have an attrition rate as high as regular registrants.

In terms of student characteristics, Bryant et al. (1996) provided overall information on the academic class, ethnicity, and gender of the late registrants but not for the university-wide student population. Therefore, it was not possible to determine from the information presented how typical the late registrants were in comparison to the rest of the study body. In addition, specific student attrition data by class status, ethnicity, and gender was not provided for the late registrants or the university-wide registrants so a more in-depth comparison was not possible. A qualitative portion of the study involved thirty of the late registrants randomly selected for interviews. Only 15 of these students were successfully contacted to arrange interviews and only six actually showed up. This very small nonrandom sample prevented generalizing the findings of this study to the larger population.

The six students interviewed were all freshmen and sophomores. Bryant et al. (1996) reported several themes from the interviews including some that indicated that late registrants were at a higher risk of dropping out or failing classes. Among the themes reported was that students' motivation to attend college was due to career and financial advancement intentions, family members had positively influenced their decision to attend college, and that the interviewees' lives consisted of a myriad of mishaps and instances of bad luck. Bryant et al. concluded that late registrants could be thought of as socially and academically isolated and in need of greater support services than other students.

Several studies were found that examined community college students and the late registration phenomenon. Stein (1984) investigated GPA and attrition rates of late registrants who were new students at Minneapolis Community College. This study defined late registrants as those students enrolling for classes from three days prior to the start of the academic quarter to eight days after the term had started. The study identified new students from those who were late registrants for the 1984 winter quarter. Data collected on these new students included their GPA, number of credit hours taken, and persistence to the next academic quarter (spring 1984) as compared to the total student body. Analysis of the data indicated that 25.1% of late registrants earned no grade points (withdrew from the class or received an F) as compared to 21.4% of the whole student population for the 1983 fall quarter. However, the percentage of late registrants that earned an "A" grade was 28% as compared to 17.6% of the whole student body for 1983 fall quarter. The study also found that of the new student late registrants, only 23.4% registered for the following quarter. A cross-sectional comparison to data collected on the whole student body in 1973, 1976 and 1979 indicated that persistence rate for the whole student body was approximately 62.5%.

Peterson (1986) also focused on GPA and attrition rates when she conducted a study of late registrants at Honolulu Community College. Her analysis of the students who registered late was that their completion rate was unusually high, with only eight students dropping out of school during the semester. The late registrants attempted a total of 214 courses and completed a total of 152. Peterson concluded that the late registrant is dropping one or two classes but is not usually dropping completely out of school. In terms of course grades, Peterson found that late registrants who took only three to nine credit hours had a much higher rate of successful completion than those who took more than 12 credit hours. Transcripts of the students indicated that those who enrolled for more than 12 credit hours almost always dropped at least one course or received an "N," "W," or "F." In addition, Peterson found that the rate of success rises when students enrolled in vocational courses as compared to liberal arts courses. All eight of the students that dropped out of school completely were enrolled in liberal arts courses.

In a larger study with a different focus, Angelo (1990) measured the effects of late registration on student persistence and academic achievement in community college students. Two hypotheses were proposed: (1) students registering late would have significantly lower persistence rate in that class than timely registrants, and (2) late registrants who persist would have a significantly lower overall level of academic performance than timely registrants. Late registration was defined as any enrollment occurring after the close of the first week of instruction. The two student samples in Angelo's study were comprised of randomly selected late registrants from a population of 3,866 late registrants from the spring 1988 semester and randomly selected timely registrants from a population of approximately 38,900 students during the same semester. Both samples were divided into subgroups: the persisting students and non-persisting students. An analysis of student grades indicated that 51% of the timely registrants earned grades of unsuccessful completion (i.e., "W," "F," "NC," or "I") compared to 45.7% of late registrants. The fact that late registrants had only a 5.3% lower course non-completion rate was a surprise to Angelo and did not support the first research hypothesis. In terms of academic performance, the mean grade for timely registrants was 2.98 and the mean grade for the late registrants was 2.97. This lack of a statistically significant difference between the two groups did not support the second research hypothesis.

Angelo (1990) offered several explanations for the surprising findings. First, Angelo explained that the diversity found in community college students had a significant impact on the findings. He contends that the diverse student body in community colleges creates an environment where variables are so diverse and complex that simple linear relationships do not exist. Second, focusing on the timely registrant, he suggested that some students that register early are actually “academic window shopping” (p. 326) and this could explain the higher non-completion rate of early registrants. This suggests that when a student registers does not imply the amount of conviction or certainty influencing a student’s development of his or her course schedule.

Other studies on late registration at community colleges have been conducted by examining GPA and attrition in a particular course or set of courses. Sova (1986) studied students who enrolled in either (English) ENG 090 or ENG 110 at Broome Community College in the fall 1985 semester. The purpose of the study was to determine if the late registrants in these classes were at greater risk of withdrawing or failing than students who registered on time. Late registrants were defined as those students who enrolled after the first day of the semester. An analysis of the final grades indicated that for ENG 090, 38.5% of late registrants passed the course as compared to 47.6% of regular registrants; for ENG 110, 52.8% of late registrants passed the course as compared to 78.3% of regular registrants. The attrition rate for late registrants in ENG 090 was 28.2% compared to 2.3% of regular registrants; the attrition rate for late registrants in ENG 110 was 17.4% compared to 16.4% of regular registrants. Sova suggested that the small difference in attrition rate for the two kinds of students in ENG 110 was due to the fact that regular registrants planned more carefully and when they determined that they would not earn a passing grade in the class, they would withdraw instead of receiving a poor grade.

In the only other large-scale study published on community college students related to late registration, Belcher and Patterson (1990) examined students attending Miami-Dade Community College to determine the number and characteristics of students registering late. This study is the only one found in the literature that identifies some characteristics of the late registrants although only a single semester of behavior is studied. For this study, late registration was defined as occurring on the last week before classes began and later. The other purposes of the study were to identify the reason students registered late and whether registrants could be expected to change their behavior if policies were changed.

The researchers found that 19.9% of all students enrolled during the week prior to the start of classes and 12.4% of students registered after classes began. Regarding the characteristics of the late registrants, it was determined that most: (a) were not pursuing a degree; (b) tended to be former students; and (c) were more likely to be part-time students, males, Black non-Hispanics, and older than recent high-school graduates. A variety of reasons were given by the students surveyed for registering late, with only 58% of the respondents fully aware that they were registering after the first day of classes. When asked if they would register earlier if a late registration fee were imposed, 74.1% said they would and 79.7% said they would if there were no registration allowed after the first day of class.

Student Class Schedule Changes

Other studies have focused upon the registration behavior of students in terms of when adjustments are made to their schedule of classes, what kinds of students are most likely to make changes, and the reason students add and drop courses. This section will first examine these kinds of studies conducted at the senior institution level and then review those conducted at the community college level.

Fleming, Hill and Merlin (1985) investigated efforts at Clemson University to address the student drop-add policy. As part of the process of developing this new policy, university officials determined that it was necessary to identify the characteristics of students who typically drop courses. Data were compiled on undergraduate drop-add activities for the spring 1981, fall 1981, and spring 1982 semesters. These data included the total number of hours each student originally enrolled in, the number of hours dropped in the first four weeks (called the "free period"), and the number of hours dropped during the rest of the semester up until five weeks prior to the end of the semester (called the "W" period).

Fleming et al. (1985) labeled students who dropped classes in two of the three semesters as "chronic-droppers" and students who dropped classes in all three semesters as "super-droppers" (p. 7). A comparison of these two groups was made with the entire student body and it was determined that an unusually high number of the dropped hours were from the chronic- and super-droppers. An in-depth analysis was then conducted on these two groups to identify the characteristics of the students that comprised them. Results of the analysis indicated that 28.8% of the student body were chronic-droppers and responsible for an average of 57.3% of the dropped hours. In addition, these chronic-droppers represented 74.8% of all the students that dropped any classes. It was determined that 6.7% of the student body were super-droppers and responsible for an average of 18.8% of the dropped hours. The super-droppers represented 17.3% of all the students that dropped any classes.

In terms of the characteristics of the students who were labeled as chronic-droppers, compared to the regular student population, they were more likely to be male, juniors, and majoring in the College of Commerce and Industry. Finally, for GPA, chronic-droppers were more likely to have a GPA in the 1.60 -2.40 range (4.00 scale). The characteristics of the students who were labeled as super-droppers were virtually identical to the chronic-droppers.

Fleming, Hill and Merlin (1985) thought that they would find an average student being responsible for most of the course dropping activity. This analysis clearly disproved this expectation and indicated that a majority of courses were being dropped by two sets of students: the chronic- and super-dropper. While the students in these two groups were not completely identical, they did share a number of common characteristics: male, junior status, and likely to major in the Commerce and Industry.

Morris (1986) conducted a study that examined students adding and dropping classes at Kentucky State University in fall 1982. Among the many purposes of the study, Morris investigated the proportion of the student body engaged in changing their registration, if there was a relationship between certain student characteristics (gender, ethnicity, residence, and academic division registered in) and the incidence of changing their class schedules, the types of classes changed most frequently, and if there was a greater incidence of changing course schedules for any particular group of students. Data were collected via survey instruments and of the 762 surveys mailed, only 208 (27.7%) were returned completed and these formed the data for analysis. Morris (1986) conducted a simple percentage analysis for identifying the kind of classes that were added and dropped. The most frequency of adds and drops were found in lower division courses (100 and 200 level) for the English/Speech, Accounting, Computer Science, and Mathematics/Physics areas. Morris also indicated that males had a significantly higher percentage of drops and adds than females (38% versus 31%), Blacks had a much higher percentage of adds and drops than Whites (47% versus 25%), and there was no significant difference in adds and drops between academic areas.

Moran, Bausili, and Kramer (1995) conducted a study to determine the reasons for student adds and drops of courses at a comprehensive four-year urban college. The purposes of the study were to examine the reasons students gave for their participation in course adds and drops, calculate the percentages of students participating for each reason, and determine whether students were adding and dropping classes for frivolous reasons or because there were deficiencies in the institution's registration system. From the 20,313 requests for a change to a course schedule, a group of students who made changes to their spring 1993 course schedule comprised the research sample for this study. Only 140 students in the sample responded to a questionnaire for a 35% return rate.

The responses on the questionnaire indicated that 12 – 22% of the students said that institutional changes in the schedule or instructor was the reason they added or dropped a class; various institutional regulations were cited by 8 - 19% as a cause for them to add or drop a class. In addition, 45% of students indicated that they purposely enrolled in classes they did not want or need but to maintain full-time student status until the class they wanted became available. Other reasons indicated by students were: (a) 30% of respondents had to add or drop a class due to an error they made at advance registration, (b) 15% of respondents claimed they changed their major, (c) 41% said they found a more interesting course, and (d) 35% claimed they did not like the course or the instructor. Overall, the evidence did not support the notion of students having frivolous reasons for adding and dropping classes. The evidence also clearly showed there were many legitimate reasons that students add and drop courses.

Related to community colleges, Broadbent (1975) described a registration problem of incredible proportion that occurred at Leeward Community College in Hawaii in the middle 1970s. Basically the problem centered upon the fact that an institution of 5,678 students experienced at least 4,100 student course schedule changes taking place in the fall 1974 academic semester. In an effort to understand the problem, an Ad Hoc Committee on Registration was established. The committee initiated the study of the problem by examining the registration behaviors of students in the spring 1975 semester. This was accomplished by analyzing all student schedule changes—i. e., addition of a class (add), withdrawal from a class (drops), and combination changes—throughout the term up until the last two weeks of the semester. Data collection was facilitated by the imposed use of a new form by students. Students requesting a change in their class schedule had to complete the form and turn it in to registration staff prior to any official change being made to a student's class schedule.

The two main foci of the analysis were the time that a change was made to the course schedule and whether the adjustment involved an "add" of a course. In terms of time of change, Broadbent established the two categories: (1) a change that occurs within the first three weeks (early changes); and (2) a change that occurs later than the first three weeks (late changes). Analysis of the student responses indicated that 85% of the course schedule changes were made during the first three weeks of the semester. In addition, 85.5% of the class changes involved one or more classes added.

Another of the main purposes of Broadbent's (1975) study was to determine the characteristics of those students who required post-registration class schedule changes. Student variables used in the analysis were gender, class level, academic major, and type of financial assistance. Analysis of the data indicated that approximately 56.4% of the students making changes were men; men made 57% of the early changes and 56.8% of the late changes. For the entire study population, second semester freshmen made the most schedule changes (39.6%), first semester freshmen made the second most changes (19.3%), and those that marked "other" for their class level made 16.6% of the changes. Those making the fewest changes were first semester sophomores (7.4%). In terms of academic major, liberal arts majors (52.6%) made the largest number of class changes in. However, since liberal arts majors accounted for 75% of the total student credit hours at the college, the percentage of students changing their classes was proportionately less than students with other academic majors. The next largest academic group of class changes was a combination of "other" and "unclassified" (21.7%), followed by Business Education majors (14.7%). Finally, students who received no financial assistance accounted for 59.5% of the class changes, those receiving Veteran's benefits accounted for 31.5% of the changes, and those with other benefits accounted for 7.8% of the changes. Collectively, these findings on student characteristics related to schedule change activity provided important descriptive information useful in understanding the results of the present study.

Having reviewed the scholarly literature related to student background characteristics, academic outcomes, and enrollment and registration behaviors, a discussion of the theoretical linkages between those variables is presented next. A brief review of college student attrition theoretical models followed by a more detailed description of the Bean and Metzner (1985) model follows.

Theoretical Models of Student Attrition

Many of the studies reviewed in this chapter focused on a single variable or single sets of variables and the relationship with student academic outcomes. While this univariate approach does provide valuable information on specific variables, it fails to identify the complex relationships that exist among many variables, it does not identify which variables may be more important, and which ones may not contribute uniquely to student academic outcomes. Multivariate studies are necessary for understanding the complexity of student academic outcomes. Moving to a multivariate approach requires a theoretical model for anticipating and explaining the relationships among variables studied.

Theoretical models of college student attrition have been developed by several researchers to identify and analyze the numerous variables that impact a student's decision whether to remain in college or dropout (Bean & Metzner, 1985; Spady, 1970, 1971; Tinto, 1975). Three of these attrition models are representative of those typically used in studies of community college students and are reviewed in order to provide appropriate background for the present study.

Attributed with one of the earliest models of student attrition, Spady (1970, 1971) applied the work of Durkheim (1951) to his development of a college student attrition conceptual model. Essentially, Durkheim found that suicidal tendencies increased in people who were not integrated socially and normatively into their existing social system. Spady (1970) perceived a parallel process occurring in college students who dropped out, albeit not as drastic as suicide. Students who did not share values and orientations similar to other students, did not interact socially with other students, and generally did not feel compatible with the social system of college were more likely to drop out.

Spady's (1970) initial model of college student attrition proposed five independent variables, four of which (grade performance, intellectual development, normative congruence, and friendship support) actually influenced the fifth variable (social integration). These five variables were then linked indirectly to the dependent variable (dropout decision) through two intervening variables (satisfaction, institutional commitment). Spady (1971) then applied his proposed model for college student attrition in a longitudinal study of 683 first-year undergraduates at the University of Chicago in 1965. His purpose was to operationalize the variables of the model and analyze how separate components and interrelationships explained the attrition process. Spady's (1971) revised model, based on his findings in this study, retained the elements in his original model but added two important improvements. The first was the inclusion of a separate component for the model comprised of structural relations and friendship support. The second improvement in the model was a revision of the relationships and interrelationship among the components in the model.

Tinto (1975) completed the next major development of a student attrition model. Also connecting his model to the theories proposed by Durkheim (1951), and building on the work of Spady (1970), Tinto's model for college student attrition continues to be the most widely recognized and tested model (Bean, 1986; Pascarella, Smart, & Ethington, 1986). Tinto believed that a student's tendency to stay in college was related to the degree to which the student felt integrated into the social and academic life of the college. Basically, Tinto contended that the cumulative interaction over time of categories of variables that included backgrounds, initial commitments to college study, and interactions with peers and faculty contributed to both social integration and academic integration. Several studies have confirmed that the construct of integration proposed by Tinto is predictive of student attrition (e.g., Pascarella & Terenzini, 1980; Pascarella & Chapman, 1983; Terenzini, Lorang, & Pascarella, 1981). Additional research has indicated that for two-year and four-year commuter students, academic integration has more indirect effect on attrition than social integration (see Pascarella & Chapman, 1983; Pascarella & Wolfe, 1985; Tinto, 1987).

Bean and Metzner (1985) developed the next major model of student attrition. They contended that the theoretical models of student attrition developed by Spady (1970), Tinto (1975), and Pascarella (1980) relied heavily on socialization to explain attrition. Since the nontraditional student did not have the opportunity to become socially integrated into the institution, a different theory was needed to link the variables that could help explain the attrition process for this group of students. Bean and Metzner's conceptual model (see Figure 1) was developed with this in mind and was based on a model originally developed by Bean (1980) and then modified to its current format. It is this model of nontraditional student attrition that the present study utilizes as a theoretical base.

Before describing the model, however, it is important to understand that the model specifically addresses the attrition of nontraditional undergraduate students. Bean and Metzner (1985) defined this group of students by using at least three factors: age, residential status, and full- or part-time student status. Moreover, Bean and Metzner defined these students as having significantly less social contact with faculty and peers as compared with traditional students. Bean and Metzner offered a definition for this group of students typically attending commuter 4-year institutions and community colleges:

> A nontraditional student is older than 24, or does not live in a campus residence (e.g., is a commuter), or is a part-time student, or some combination of these three factors; is not greatly influenced by the social environment of the institution; and is chiefly concerned with the institution's academic offerings (p. 140).

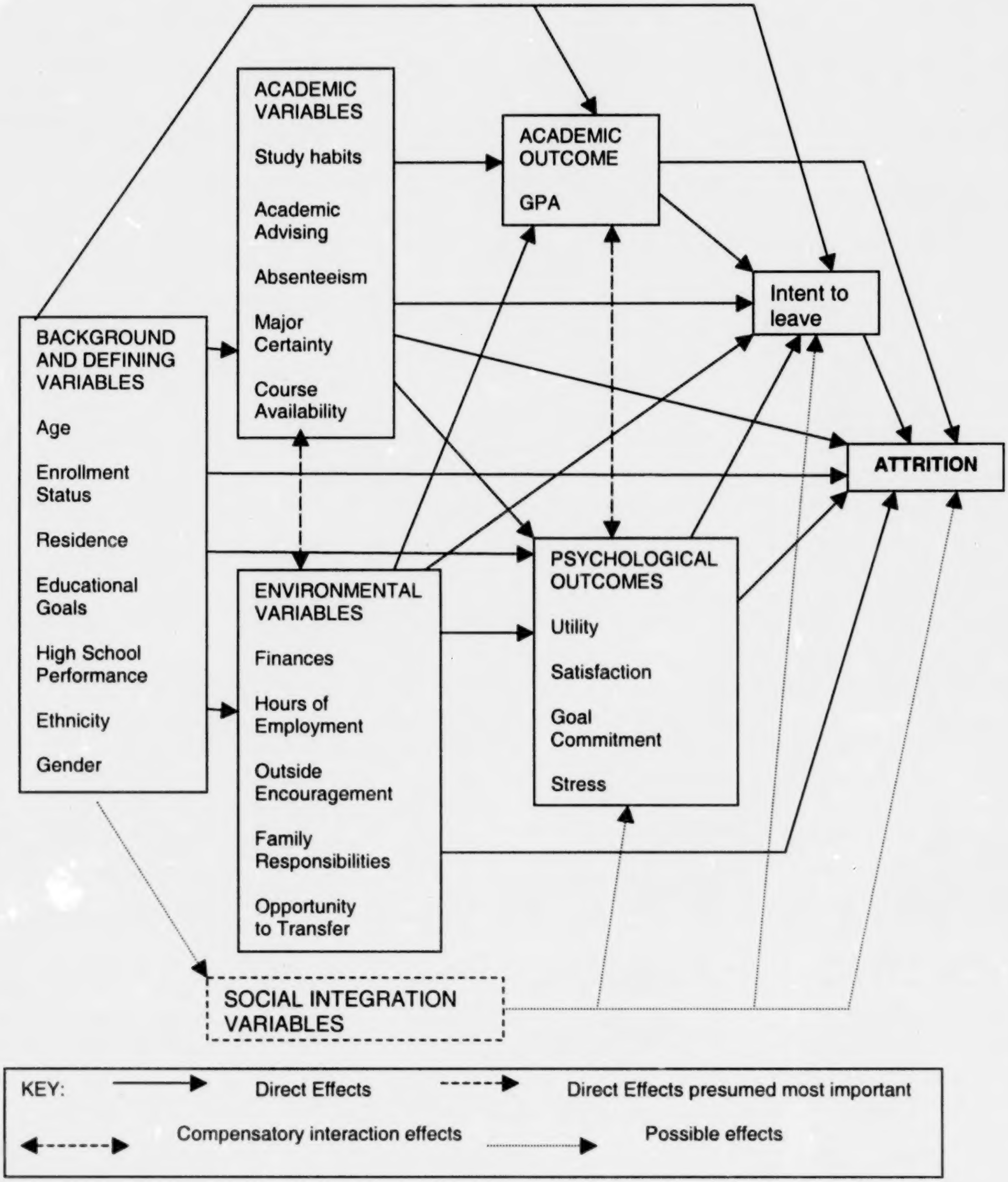
ACADEMIC VARIABLES
Study habits
Academic Advising
Absenteeism
Major Certainty
Course Availability
ACADEMIC OUTCOME
GPA
Intent to leave
BACKGROUND AND DEFINING VARIABLES
Age
Enrollment Status
Residence
Educational Goals
High School Performance
Ethnicity
Gender
ATTRITION
ENVIRONMENTAL VARIABLES
Finances
Hours of Employment
Outside Encouragement
Family Responsibilities
Opportunity to Transfer
PSYCHOLOGICAL OUTCOMES
Utility
Satisfaction
Goal Commitment
Stress
SOCIAL INTEGRATION VARIABLES
KEY:
Direct Effects
Direct Effects presumed most important
Compensatory interaction effects
Possible effects

Figure 1. Bean and Metzner model of non-traditional student attrition. (1985)

This conceptual model, specifically developed for nontraditional students, recognizes the smaller role that social integration plays in attrition for those students. Bean and Metzner (1985) explain that the elements that comprise their model are the result of a thorough review of the literature on nontraditional students. The linkages between the elements in their model are derived from other models of traditional student attrition and behavioral theories. Basically, Bean and Metzner's model posits that a student dropout decision is primarily based on four sets of variables: (a) academic performance as measured by grade point average; (b) intent to leave which is influenced primarily by psychological outcomes and academic variables; (c) background and defining variables, primarily high school performance and educational goals; and (d) environmental variables, expected to have substantial direct effects on dropout decisions. There are also two important compensatory interaction effects that are included in the model. The first is between the element, "Academic Variables" and the element, "Environmental Variables." Bean and Metzner consider the environmental variables important enough to cause a nontraditional student who even has low values for the academic variables to stay in college if the values for the environmental variables are in a positive direction. Conversely, however, in a situation where a student has very high values for academic variable but values for environmental variables in a negative direction, that student is likely to drop out. The second compensatory interaction is between the element, "Academic Outcomes" and the element, "Psychological Outcomes." Bean and Metzner consider the psychological outcomes as important enough to cause a nontraditional student who even has poor academic outcomes to stay in college if the psychological outcomes are positive. Conversely, however, in a situation where a student has very positive academic outcomes but negative psychological outcomes, that student is likely to drop out.

Chapter Summary

Research on community college student outcomes is overwhelmingly concentrated on student attrition studies. Many researchers also refer to these studies as persistence, retention, dropout, or early departure studies but they all essentially focus on the phenomena of when and why students leave college.

Research conducted on the characteristics of community college students and how they relate to academic outcomes is extensive. Studies conducted on the relationship between student age and outcomes have largely indicated a significant relationship with older students more likely to drop out than younger students. Two exceptions to this finding were Feldman (1993), who found younger students at greater risk for attrition, and DeVecchio (1972) who did not find any significant relationship between age and academic outcomes. Studies conducted on the relationship between gender and outcomes have seen mixed results with a majority of the studies on community college students finding no relationship between gender and academic outcomes. Studies that investigated the relationship between student ethnicity and outcomes found that none existed with community college students. Researchers that examined academic intent and its relationship to outcomes found that students with certificate or degree aspirations persisted at a much higher percentage than students not identifying any academic goals in college. No studies were found, however, that examined the relationship between transfer and occupational majors. Finally, studies that included the investigation of student financial aid eligibility—a frequently used proxy for socioeconomic status—have found mixed results in terms of the relationship with academic outcomes.

Another group of studies reviewed in this chapter examined the relationships between student academic outcomes. Studies that investigated the relationship between grade point average and attrition found strong associations when looking at senior institutions. However, studies conducted with community college students have resulted in mixed results with approximately equal numbers of studies finding significant relationships between GPA and attrition as those studies that did not find relationships. A few other researchers examined the relationship between course completion and attrition and these also resulted in mixed findings.

The research on student enrollment and registration behaviors has been limited to studies that have investigated late registrants or studies that have explored course schedule changes. The literature on late registration is very limited so reviews of studies conducted both at the senior institution level and in community colleges were included in this review. Findings from studies at senior institutions indicated that late registrants were more likely to dropout or earn a lower GPA than timely registrants. Studies of late registration conducted at community colleges resulted in mixed findings with some researchers reporting late registrants performing nearly the same as regular registrants and other studies indicating they performed not as well.

Studies of student course schedule changes were also very limited so research conducted at senior institutions as well as community colleges was reviewed. Studies at senior institutions identified the characteristics of students that dropped and added courses, and identified the types of courses most often involved in adds and drops. Only one study conducted at a community college was found that investigated schedule changes made by students. This study identified when changes were typically made and the characteristics of students who made those changes. The findings were that 85% of the changes were made during the first three weeks of the semester and changes were more likely to be made by males, second semester freshmen, liberal arts majors, and students not receiving any financial aid.

Finally, this chapter reviewed the theoretical models that have been developed and utilized to examine and explain student academic outcomes and attrition. Early models were developed with a focus on traditional students attending four-year residential colleges. More recent models have focused on nontraditional students typically found attending community colleges. Bean and Metzner (1985) developed a model that has similarities with the conceptual framework developed for the present study. Sharing several of the elements of the Bean and Metzner model, this new model which is described in the next chapter, provides a conceptual framework for anticipating and understanding the relationships, associations, and linkages between the variables investigated.

CHAPTER 3

METHODOLOGY

The purpose of this study was to investigate the relationships between community college student enrollment and registration behaviors and student characteristics and academic outcomes. This chapter describes the methods utilized to answer the five research questions and test the eight research hypotheses articulated in Chapter 1. Additionally, a description of the conceptual framework developed for this study identifying the expected relationships between variables is discussed at the beginning of the chapter. Following that description, the chapter is presented in six sections: (a) research design, (b) population and sample, (c) description of institutional enrollment and registration policies, (d) variables, (e) data management, and (f) data analysis.

Five research questions provided the direction for this study:

(1) What are the relationships between student characteristics and enrollment and registration behaviors?

(2) What are the interrelationships among enrollment and registration behaviors?

(3) What are the interrelationships among student academic outcomes?

(4) Do student enrollment and registration behaviors predict student academic outcomes?

(5) Controlling for student characteristics, do enrollment and registration behaviors predict student academic outcomes?

Conceptual Framework for the Study

The present study introduced a conceptual framework (see Figure 2) based on Bean and Metzner's (1985) model of nontraditional student attrition described in Chapter 2. Several components of the Bean and Metzner model—refer to Figure 1 in Chapter 2—are associated with components in this framework.

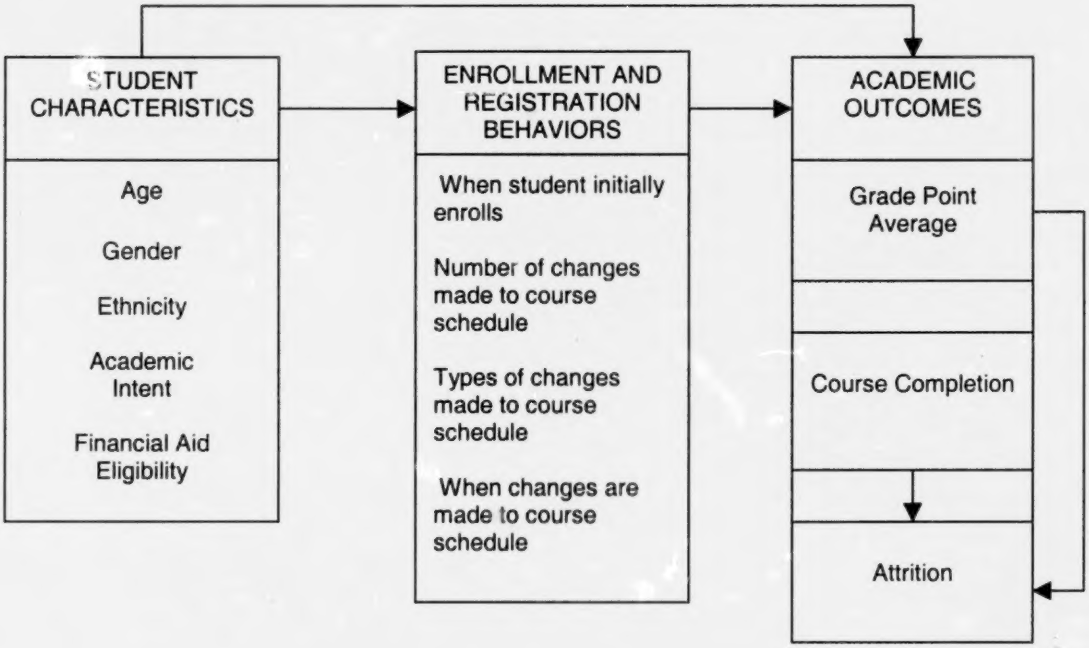
STUDENT CHARACTERISTICS
Age
Gender
Ethnicity
Academic Intent
Financial Aid Eligibility
ENROLLMENT AND REGISTRATION BEHAVIORS
When student initially enrolls
Number of changes made to course schedule
Types of changes made to course schedule
When changes are made to course schedule
ACADEMIC OUTCOMES
Grade Point Average
Course Completion
Attrition

Figure 2. Conceptual model of student academic outcomes.

First, similar to the "Background and Defining Variables" portion of Bean and Metzner's model, the new conceptual framework included an area identified as "Student Characteristics." Bean and Metzner's model included seven variables within this area; the framework for this study included five variables. Both Bean and Metzner's model and the framework for the present study included student age, gender and ethnicity as variables within this area. Bean and Metzner's model included enrollment status and residence; these were not included in the present framework since all students in the sample were full-time and commuter students. Bean and Metzner's model also included high school performance but this was not part of the research focus for the present study and therefore was not included in the framework. Bean and Metzner's model included educational goals as a variable; in a similar fashion, academic intent was included in the framework for the present study. Finally, the framework for this study included financial aid eligibility as the fifth variable in "Student Characteristics" since it was considered a condition that existed prior to matriculation at the institution.

Second, associated with the "Academic Variables" portion of Bean and Metzner's model, the new conceptual framework included an area identified as "Enrollment and Registration Behaviors." Bean and Metzner's model included five variables within this area; the framework for the present study included four variables. Bean and Metzner's model included variables related to student behaviors such as absenteeism and study habits. It also included the variables, academic advising, course availability, and major certainty. This area of the framework for the present study only included four specific student enrollment and registration behaviors that were the primary focus of the present study.

Third, identical to the "Academic outcome" area in the Bean and Metzner model, the new conceptual framework included an area identified as "Academic Outcomes." Bean and Metzner's model indicated grade point average as the single variable within that area of their model; the new model included "course completion" as a second variable and "attrition" as both an academic outcome variable and as a component by itself, similar to the original model.

Research Design

This study was based on an ex post facto research design that involved the investigation of a sample of students during one period of their enrollment at a small rural community college in fall 1994, fall 1995, or fall 1996. It was not a longitudinal study because the sample of students was investigated for a single period of time that included only one full academic semester.

An ex post facto research design was utilized in this study for several reasons. First, the nature of the study required no control of the independent and dependent variables (Kerlinger, 1973). Second, there was access to existing data already stored in a mainframe computer system at the institution where the students attended.

This study also followed the design of a secondary analysis study. Becoming a more commonly utilized method for researchers in education and the social sciences, this study used a comprehensive institutional student computer database as its source of data (Turner, 1997). The nature of the database, its method of creation, and ongoing development were all areas that were familiar to the researcher. This direct knowledge of the procedures related to the data stored in the computer system mitigated the problems associated with secondary data analysis (Frankfort-Nachmias & Nachmias, 1996). Secondary data analysis can be hampered by limited access to the data, data that only partially represents the actual information investigated by the researcher, and insufficient information about the collection of the data for the purposes of establishing accuracy and validity. All of these limitations were overcome by the researcher's direct and comprehensive knowledge of the institution, the development of its student computer database, and access to staff responsible for the creation and maintenance of student information.

Variables

The variables examined in this study included five student characteristic variables, multiple predictor variables, and three outcomes variables. All of these variables were based on existing student data stored in the administrative mainframe computer system. Some of the variable values were retrieved directly from data stored in students' computer records; other variable values were created through the use of computer programs.

The five student characteristic variables investigated in this study were student age, gender, ethnicity, academic intent, and financial aid eligibility. Data on student gender, ethnicity, and financial aid eligibility were obtained directly from specific data field values in the student computer records that originated from written information on an admissions application and the Free Application for Federal Student Aid (FAFSA) filled out by each student. Data on student age and academic intent were derived through the use of computer programs that manipulated other existing data fields in the student computer records to calculate a defined value for those variables.

The predictor variables and outcomes variables were derived from enrollment and academic transcript computer data stored on each of the students. Some variables were extracted from the database as direct values and others were calculated using computer programs and manual review of other existing data fields. The variables were operationalized as follows:

Student Characteristics

Age. This was calculated as the difference in whole number of years from the student's date of birth to the start of the fall semester that the student initially enrolled. The date of birth information was taken from student computer records created from information provided by students on the application for admission. For this study, age was treated as a dichotomous variable. Traditional-age students were defined as students who were less than 25 years old; nontraditional-age students were defined as students who were aged 25 years and older. The continuous data available for this variable was categorized into the dichotomous values to fit the conceptual framework established for this study. The differences in relationships between traditional-age students and nontraditional-age students were of interest. This variable was coded as: Traditional-age = 0; Nontraditional-age = 1.

Gender. The value for this variable was taken from student computer records created from information provided by students on the application for admission. For this study, gender was coded as: Female = 0; Male = 1.

Ethnicity. The value for this variable was taken from student computer records created from information provided by students on the application for admission. Students were provided with the following choices on the application: African American, American Indian or Alaskan Native, Asian or Pacific Islander, Hispanic, Non-Resident Alien, Undeclared, and White. Because an extremely small number of students who indicated that they were American Indian or Alaskan Native (n = 3), Asian or Pacific Islander (n = 4), Hispanic (n = 18), and Non-Resident

Alien (n = 0), these students were not included in the statistical analyses that utilized the ethnicity variable. A significant number of students reported as Undeclared (n = 118), and these students were also not included in the analyses that utilized ethnicity variable. For this study, values were coded as: Black = 0; White = 1.

Academic intent. The value for this variable was derived from the student's identification of an academic major from the institution's listing of Associate Degree and Certificate programs offered. A computer program was written to translate the various degree and certificate options into a dichotomous value. The value for this variable was collected when the student was initially enrolled in fall semester classes. This was the only point in time where the variable value was identified for this study. This variable was coded as: Occupational major = 0; Transfer major = 1.

Financial aid eligibility. Used as a proxy for socioeconomic status, the value for this dichotomous variable was derived from information entered into student computer records from financial aid data received from the United States Department of Education. Federal information on students was based on self-reported income, parental ability to support if applicable, and financial asset information submitted on the FAFSA form. This variable was coded as: Not eligible = 0; Eligible = 1.

Enrollment and Registration (Predictor) Variables

When student initially enrolls. This was reported as the whole number of days between when a student initially registered for classes and the start of the fall semester. Positive values indicated the number of days prior to the start of the semester, negative values indicated the number of days after the start of the semester, "0" indicated that the student enrolled on the first day that the semester began.

Number of course schedule changes. This was reported as the total number of course adds, drops, and section changes made by a student to his or her schedule of courses for the fall semester. This cumulative count included changes made from the day after the student initially enrolled to the last day of the fall semester. The count did not include institutional adds, drops, and section changes of courses due to administrative procedures involving late tuition payments, temporary course cancellations, and other circumstances that required a student to be temporarily dropped from a course and then later reinstated into the same course.

Type of course schedule changes. This variable was actually treated as three separate variables: (a) number of course adds, (b) number of course drops, and (c) number of course section changes. For each of the three variables, the number of occurrences of the behavior was counted. This cumulative count included changes made from the day after the student initially enrolled to the last day of the semester.

When course changes were made. This variable was a combination of when course adds were made, when course drops were made, and when course section changes were made. The three types of changes were collectively examined to calculate a single value that indicated the proportion of changes that were made to students' course schedule early in the add-drop period as compared to changes that were made late in the add-drop period. The early add-drop period was defined as all days prior to the start of the fall semester and the first seven days of the fall semester. The late add-drop period was defined as eight calendar days and later from the start of the fall semester. This value was reported as a percentage.

Academic Outcomes Variables

Fall semester grade point average (GPA). The college utilized a quality point system for determining GPA based upon 5.00 scale where A = 5.0, B = 4.0, C = 3.0, D = 2.0, F = 1.0, and Drop or Withdrawal = 0.0. The value for this variable was taken directly from a data field in students' computer records.

Fall semester course completion. This was reported as the percentage of fall semester hours completed by the student with a course grade of D or higher as compared to the number of credit hours enrolled in by the student at the 10th day of instruction for the fall semester. This continuous variable was reported directly from a data field in student computer records.

Attrition. This was determined by whether the student enrolled in classes for the spring semester immediately following the fall semester of initial enrollment. Treated as a dichotomous variable, the student was coded as: Not enrolled next semester = 0; Enrolled next semester = 1.

A summary of all the variables for the study are presented in Table 1.

Table 1

Definitions and Coding of Variables

Variable	Definition and Coding
Age	Students aged 25 years and older and were coded as nontraditional-age = 0; students aged less than 25 years were coded as traditional-age = 1
Gender	Student gender was coded as 0 = Female, 1 = Male

(table continues)

Table 1 (continued)

Variable	Definition and Coding
Ethnicity	Student ethnicity was coded as 0 = Black, 1 = White
Academic Intent	Student academic intent was coded as 0 = Occupational, 1 = transfer
Financial Aid Eligibility	Student eligibility for financial aid was coded as 0 = Not eligible, 1 = Eligible
When Student Initially Enrolls	This was a continuous variable recorded as a whole number of days that ranged from +154 to - 29
Number of Course Changes	This was a continuous variable recorded as a whole number of instances that ranged from 0 to 19
Type of course changes	
Drops	This was a continuous variable recorded as a whole number of instances that ranged from 0 to 10
Adds	This was a continuous variable recorded as a whole number of instances that ranged from 0 to 9
Section Changes	This was a continuous variable recorded as a whole number of instances that ranged from 0 to 5

(table continues)

Table 1 (continued)

Variable	Definition and Coding
When Course Changes Were Made	This was a continuous variable recorded as the proportion of changes made early during the add-drop period
Attrition	Dichotomous variable coded as 0 = Not enrolled for Spring semester, 1 = Enrolled for Spring semester

Population and Sample Selection

The sample for this study consisted of all first-time full-time college level students seeking a certificate or degree who first matriculated at one small rural community college in the Midwest. The sample for this study was comprised of three cohorts of first-time full-time students who enrolled in the fall semester of 1994, the fall semester of 1995, or the fall semester of 1996 ($\underline{n}$ = 1,365).

The institution investigated in this study is a small public community college located in a largely rural area of East-Central Illinois. The community where the institution is located has an economy primarily supported with manufacturing, warehousing and distribution, and service sector employment fields. The community college resides in a district with a population of approximately 97,800 people. The institution has an approximate annual operating budget of $10 million, employs 205 people on a full-time basis, of which 53 are full-time faculty members.

The college serves approximately 2,800 degree-credit students annually; approximately 1,300 of those students are enrolled on a full-time basis. The gender of degree-credit students is 39% male and 61% female; ethnicity is 79% white, 9% black, 2% Hispanic, and 10% that did not indicate. The academic intent of students as indicated by their declared major is as follows: 42% of students were enrolled in transfer programs, 40% enrolled in occupational programs and 18% were enrolled in adult education or non-credit courses. Finally, approximately 44% of students received need- or merit-based financial assistance from at least one of the following categories: (1) federal, (2) state, (3) institutional, or (4) "other," which included scholarships and tuition reimbursement from employers.

Description of Institutional Enrollment and Registration Policies

Enrollment and registration procedures at the institution in this study reflected the open-door mission of a public community college. Other than requiring a high school diploma or GED, all students were welcomed into the institution to enroll in college credit courses. There were restrictions placed on some courses, however. Composition, mathematics, and many liberal arts courses such as Introduction to Psychology, American History, and Ethics required a suitable placement test score to authorize student entry into the course. In addition, many individual courses had a variety of specific course prerequisites such as Advanced Machining requiring that the student had successfully completed Basic Machining.

The enrollment and registration process and procedures at the institution varied according to the number of credit hours that a student desired to take, the student's academic intent, and the student's previous matriculation history at the institution. Students that enrolled in less than 12 credit hours of courses in a fall or spring semester were at liberty to select their own courses, and—assuming they met course entrance requirements—could request to be enrolled in those courses via the telephone or by visiting the Registration Office on campus. For institutional purposes, this was considered "self-advising." Students who enrolled for 12 or more credit hours in the fall or spring semester were required to follow a different process to complete their enrollment. According to the institution's official catalog, "Students registering for 12 or more credit hours (fall and spring semester) or more than 6 hours (summer semester) are required to work with a counselor or advisor" (College Catalog, 1999, p. 34).

Other institutional policies and procedures apply to students dropping, adding, or changing a section of a course. For adding courses, consistent with the procedures described earlier regarding semester credit hour load, students were able to add courses at any time during the registration period prior to the start of the semester. Once a course had met for at least one session, however, approval from the faculty member teaching the course was required before a student could add the course to his or her schedule. This would also include a student that is changing sections of the same course. For dropping courses, the college catalog states: "Students may officially withdraw from all or part of their programs with W grades until the Friday before their final examinations. Students should contact the Admissions and Records Office and withdraw themselves" (Danville Area Community College Catalog, 1999, p. 18). Essentially, students were authorized to drop any of their courses without prior approval from a college counselor or advisor up to when final examinations began for the semester.

Data Management

The instrumentation for this ex post facto study was designed to be as objective as possible. This was achieved with a set of computer programs written in FOCUS programming language that were run on the institution's IBM MP/2000 mainframe computer system. This Administrative computer system operates in a VM/VSE environment, utilizing Systems Computer Technology (SCT) software to manage the institution's official student records. In addition, student demographic information, course scheduling information, grading, and transcripts were all accessed with the institutional software package titled Student Information System (SIS) that operated in the VM environment.

The institution first acquired this data management computer hardware and software system in 1991 and the first official student records were developed with students that enrolled beginning with the 1992 summer semester. All student records that contain matriculation activity prior to summer 1992 were maintained in paper format in the Records Office.

FOCUS is a fourth generation programming language that is itself a batch process. It can be utilized for inquiry-only types of information processing and for the present study, was utilized to access a combination of online and batch processing information. The FOCUS programs designed by this researcher and then developed by an institutional programmer were tested for accuracy through a four-part process. This process essentially became the methodology for ensuring that the data analyzed would meet appropriate reliability and validity standards.

First, the computer programs were examined by the researcher, in consultation with institutional computer programming staff, for the purposes of a face validity test. That is, the programs were studied to determine if their logic structure would result in reasonably appropriate data. Then, the programs were tested via three trial "runs" on smaller data sets of 25 students to determine if the programming logic and resulting data sets appeared accurate. Third, the full FOCUS programs were reviewed by college officials responsible for the management and operation of the Administrative Computer system to determine if all appropriate data files were accessed, to verify the proper operation of the computer system during program "runs," and to verify that data output was complete and unbiased according to available memory and printer capacities. Fourth, a series of "spot" checks were conducted by the researcher through random checks on student records that were part of the three cohorts under investigation. These random checks involved manually verifying student matriculation history by printing out student records and comparing that information with the data produced from the FOCUS report. In addition, demographic and personal information were verified by accessing the original written information from the initial student application and comparing it with data retrieved by the FOCUS programs.

The researcher for this study obtained formal approval to access student data in accordance with institutional policy, the Family Educational Rights and Privacy Act of 1974, and the University of Illinois Bureau of Educational Research Human Subjects Review Committee procedures. Once the FOCUS programs were developed, tested, and run on the targeted samples of students, the full programs were run during the spring 2000 semester. To insure confidentiality, student names were replaced with a system of pseudo-numbers and all data were handled in a secure manner. Authorization to run the developed FOCUS programs was controlled by the researcher and the Director of Administrative Computing. Since the researcher was an administrative employee of the institution, the development of the FOCUS programs and subsequent analysis of the data was coordinated with the Office of Accountability, Assessment, and Planning so that the institution could utilize the programs in the future as part of the institution's assessment and strategic planning efforts.

Data Analysis

The Statistical Package for the Social Sciences (SPSS), Version 10.0 was utilized for the analyses of data (SPSS, 1999). Data were imported into SPSS from a personal computer spreadsheet program, Excel, which was created with the FOCUS program data collected on the institution's administrative mainframe computer system.

In the sections that follow, methods of analyses for each of the research hypotheses are discussed. All tests of statistical significance were conducted at an alpha level of .05, considered a reasonable level of accuracy for educational research (Minium, King, & Bear, 1993).

Table 2 presents the analyses utilized to test the research hypotheses related to the five research questions.

Table 2

Research Questions, Related Hypotheses and Statistical Methods

Research Question	Research Hypothesis	Statistical Methodology
1. Student Characteristics related to enrollment and registration behavior?	I. Student characteristics are not related to when student enrolls.	Independent samples t-tests
	II. Student characteristics are not related to number of schedule changes	Independent samples t-tests
	III. Student characteristics are not related to types of schedule changes	Independent samples t-tests
	IV. Student characteristics are not related to when schedule changes are made	Independent samples t-tests
2. Interrelationships among enrollment and registration behaviors?	V. There are no relationships among individual enrollment and registration behaviors.	Spearman rank-order correlation

(table continues)

Table 2 (continued)

Research Question	Research Hypothesis	Statistical Methodology
3. Interrelationships among academic outcomes?	VI. There are no relationships among individual academic outcomes.	Spearman rank-order correlation, Independent samples t-tests
4. Enrollment and registration behaviors predict student outcomes?	VII. Enrollment and registration behaviors do not predict academic outcomes	Multiple linear regression and logistic regression
5. Controlling for student characteristics, enrollment and registration behaviors predict student outcomes?	VIII. Controlling for student characteristics, enrollment and registration behaviors do not predict academic outcomes.	Multiple linear regression and logistic regression

As indicated in Table 2, independent samples t-tests were conducted to determine the significance of the mean value of the various enrollment and registration behaviors with the five dichotomous student characteristic variables: age, gender, ethnicity, academic intent, and financial aid eligibility. Since the variance for some of these variables analyzed by the independent samples t-tests was not equal, Levene's Test was utilized to detect the unequal variance at the $p < .05$ level and adjust the t-value accordingly (SPSS, 1999).

Relationships between the enrollment and registration behaviors were tested for significance using the Spearman rank-order correlation coefficient instead of the normally used Pearson Product-Moment correlation coefficient. Since descriptive information on these data indicated they were all distributed in a non-normal pattern, the Spearman statistic was more appropriate to use in investigating the relationships between these variables (Minium, King, & Bear, 1993; SPSS, 1999). The relationships between the academic outcomes variables that were continuous were also tested with Spearman rank-order correlation coefficients; the dichotomous variable, attrition, was tested with independent samples t-tests.

Multiple linear regression was utilized to determine the ability of enrollment and registration behaviors to predict the two continuous variables that were academic outcomes: fall semester GPA and fall semester course completion. Beta, t, B, F, and R^2 were utilized to assess the significance of the association between the variables. Stepwise selection was utilized for controlling the entry or removal of the independent variables from the regression model because there were correlations among several of the independent variables. The criteria for probability to enter a variable was set at less than or equal to .05; the probability for removal of an independent variable in the regression model was set at greater than or equal to .10. These were considered usual parameters for social science research (Pedhazur, 1998).

Logistic regression was used to investigate whether enrollment and registration behaviors could predict attrition since this variable was dichotomous. Chi-square, -2 Log Likelihood, Exp(B), and classification tables were utilized to assess the significance of the associations between variables. The Likelihood-Ratio Test was utilized instead of the Wald statistic for determining variables to be removed from the model because the Wald statistic has the disadvantage of failing to reject the null hypothesis when the null hypothesis is false due to an inflated estimated standard error (Menard, 1995). The method for exclusion of the variables in the regression analysis was the forward likelihood-ratio (LR) statistic. This is a method that checks the change in –2 Log Likelihood as well as the observed significance level for the change. If the observed significance level is greater than the cutoff value for remaining in the model, the term is removed from the model and the model statistics are recalculated to see if any other variables are eligible for removal (Menard, 1995; SPSS, 1999). Consistent with the multiple regression analyses, the criteria for probability for removal of an independent variable in the regression model was set at greater than or equal to .10. This was considered a usual parameter for social science research (Pedhazur, 1998).

A logistic regression analysis was also conducted using the student characteristic variables as control variables forced into block 1 of the regression model, entering enrollment and registration behaviors into block 2 of the model using the forward likelihood-ratio (LR) method, and entering fall semester GPA and fall semester course completion also loaded into block 2. Treating these two outcome variables as predictor variables provided the opportunity to identify their relationship to attrition above and beyond that determined by student characteristics.

CHAPTER 4

FINDINGS AND DISCUSSION

The purpose of this research was to investigate the relationships between community college student enrollment and registration behaviors and student characteristics and academic outcomes. The study investigated whether there were student characteristics that were related to specific enrollment and registration behaviors. The research included the examination of whether there were interrelationships among the enrollment and registration behaviors studied and interrelationships among the academic outcomes studied. Finally, the study also investigated if enrollment and registration behaviors could predict student academic outcomes.

This chapter is presented in seven sections: (a) descriptive data providing information about the characteristics of the sample of students in the study; (b) findings related to research hypotheses I, II, III, and IV that investigated the relationship between student characteristics and enrollment and registration behaviors; (c) findings related to hypothesis V that explored enrollment and registration behaviors to identify any interrelationships among the variables; (d) findings related to hypothesis VI that explored student academic outcomes to identify any interrelationships among the variables; (e) findings related to hypothesis VII that examined whether enrollment and registration behaviors could predict student academic outcomes; (f) findings related to hypothesis VIII that explored whether enrollment and registration behaviors could predict academic outcomes when student characteristics were held constant; and (g) chapter summary.

Descriptive Data

The sample for this study consisted of all first-time full-time college level students seeking a certificate or Associate degree who first matriculated at one small rural community college in the Midwest in fall 1994, fall 1995, and fall 1996. The sample (n = 1,365) for this study was comprised of 473 students who first enrolled in the fall semester of 1994, 461 students who first enrolled in the fall semester of 1995, and 431 students who first enrolled in the fall semester of 1996. Table 3 indicates the characteristics of the students for each of the three cohorts and the entire research sample.

Table 3

Student Characteristics

	Fall Cohorts (n)				
Characteristic	1994	1995	1996	Sample n	Sample %
Age					
Traditional	407	400	387	1,194	87.5
Nontraditional	66	61	44	171	12.5
Gender					
Female	286	270	221	777	56.9
Male	187	191	210	588	43.2

(table continues)

Table 3 (continued)

	Fall Cohorts (n)				
Characteristic	1994	1995	1996	Sample n	Sample %
Ethnicity					
Black	31	43	34	108	8.8
White	342	394	378	1,114	91.2
Academic Intent					
Occupational	168	190	159	517	37.9
Transfer	305	271	272	848	62.1
Financial Aid Eligibility					
Not eligible	250	251	287	788	57.7
Eligible	223	210	144	577	42.3

In general, each of the three cohorts were similar in characteristics except for two noteworthy exceptions: (a) the gender of the 1994 cohort was 39.5% male as compared to 48.7% male for the 1996 cohort and (b) the percentage of students that were eligible for financial aid in 1994 cohort was 47.2% as compared to 33.4% who were eligible from the 1996 cohort. The difference in financial aid eligibility was primarily due to a change in institutional policy on short- and long-term student loans. The new policy was a strategy developed to bring the institution in compliance with federal requirements for student loan default rates. Since this study did not compare students between the three cohorts, the differences were not considered to be problematic for the analyses conducted.

Throughout this study the three cohorts were always treated as a single group. The examination of them as three separate cohorts was presented here only for the purposes of establishing the similarity of the three groups.

Research Related to Student Characteristics

Research question one asked if there was a relationship between student characteristics and enrollment and registration behaviors. Research hypotheses I, II, III, and IV compared the mean value for each of the enrollment and registration behaviors studied for five pairs of subgroups that were established by the student characteristics examined in the study. Research hypothesis I examined the mean number of days prior to the start of the fall academic semester that students initially enrolled for courses. Table 4 presents the results of independent samples t-tests conducted on these variables.

Table 4

When Students Initially Enroll

Group	n	M	SD	d	t
Age					
Traditional	1,194	96.99	48.54	.67	8.250***

(table continues)

Table 4 (continued)

Group	n	M	SD	d	t
Nontraditional	171	64.27	48.24		
Gender					
Female	777	96.40	47.63	.16	2.966**[a]
Male	588	88.27	51.95		
Ethnicity					
Black	108	63.95	49.62	-.58	-5.676***
White	1,114	92.30	48.87		
Academic Intent					
Occupational	517	86.17	50.49	-.22	-3.892***[a]
Transfer	848	97.00	48.76		
Financial Aid Eligibility					
Not Eligible	788	101.25	46.64	.40	7.294***[a]
Eligible	577	81.48	51.45		

Note. [a]An adjusted t value is reported based on unequal variances of the subgroups. Initial enrollment means the number of days in relation to the start of the fall semester.

**$p < .01$; ***$p < .001$.

Results for the variable, DAYS_RG (the number of days in relation to the start of the fall semester that students initially registered), had unequal variances for several of the sets of subgroups, based on Levene's Test ($p < .05$). As a result, an adjusted t-value was reported. Results from these tests indicated a statistically significant difference in the mean number of days in relation to the start of the fall semester that a student initially enrolled for all the subgroup pairs studied. Students who were of traditional age initially enrolled on average more than 32 days earlier than students of non-traditional age. Female students averaged an initial enrollment approximately eight days earlier than the average for male students. White students averaged an initial enrollment 32 days earlier than the average for Black students. A student whose declared academic intent was a transfer major, averaged an initial enrollment 11 days earlier than the average for an occupational major. Finally, a student who was not eligible for financial aid, on average enrolled nearly 20 days earlier than the average for a student eligible for financial aid.

Based on these results, the researcher was able to reject each of the sub-hypotheses related to the first main hypothesis:

I (a) - There is no relationship between student age and when students initially enroll for the fall academic semester.

I (b) - There is no relationship between student gender and when students initially enroll for the fall academic semester.

I (c) - There is no relationship between student ethnicity and when students initially enroll for the fall academic semester.

I (d) - There is no relationship between student academic intent and when students initially enroll for the fall academic semester.

I (e) - There is no relationship between student financial aid eligibility and when students initially enroll for the fall academic semester.

The second main research hypothesis examined the mean number of times that students made changes to their fall course schedule. Table 5 presents the results of independent samples t-tests conducted on these variables.

Table 5

Total Number of Schedule Changes

Group	n	M	SD	d	t
Age					
Traditional	1,194	2.77	2.91	-.11	-1.436
Nontraditional	171	3.12	3.26		
Gender					
Female	777	2.78	2.89	-.03	-0.456
Male	588	2.86	3.04		
Ethnicity					
Black	108	3.23	2.52	.17	1.686
White	1,114	2.73	3.00		

(table continues)

Table 5 (*continued*)

Group	*n*	*M*	*SD*	*d*	*t*
Academic Intent					
Occupational	517	3.00	3.19	.10	1.803[a]
Transfer	848	2.70	2.80		
Financial Aid Eligibility					
Not Eligible	788	2.77	3.01	-.03	-.700
Eligible	577	2.88	2.88		

Note. [a]An adjusted *t* value is reported based on unequal variances of the subgroups.

Data for the variable, T_#_CNG (the number of times that students made changes to their fall course schedule), had unequal variances for one of the sets of subgroups, based on Levene's Test ($p < .05$). As a result, an adjusted *t*-value was reported. Results from these tests indicated no significant difference in mean number of course schedule changes for all the pairs of subgroups studied. Based on these results, the researcher was unable to reject each of the sub-hypotheses related to the second main research hypothesis:

II (a) - There is no relationship between student age and the number of changes students make to their fall course schedule.

II (b) - There is no relationship between student gender and the number of changes students make to their fall course schedule.

II (c) - There is no relationship between student ethnicity and the number of changes students make to their fall course schedule.

II (d) - There is no relationship between student academic intent and the number of changes students make to their fall course schedule.

II (e) - There is no relationship between student financial aid eligibility and the number of changes students make to their fall course schedule.

The third main research hypothesis examined the kinds of changes that students make to their fall course schedule. Tables 6, 7, and 8 present the results of independent samples $\underline{t}$-tests conducted on the fifteen sub-hypotheses. Table 6 reports the results of an examination of DROPS (the number of course drops made to the fall course schedule) as they related to student characteristics. Table 7 reports the results of an examination of ADDS (the number of course adds made to the fall course schedule) as they related to student characteristics. Table 8 reports the results of an examination of SEC CHNGS (the number of section changes made to the fall course schedule) as they related to student characteristics. Data for the number of drops, adds, and section changes had unequal variance for several of the sets of subgroups, based on Levene's Test ($\underline{p} < .05$). As a result, an adjusted $\underline{t}$-value was reported for those tests.

Table 6

Number of Course Drops Made to the Fall Schedule

Group	*n*	*M*	*SD*	*d*	*t*
Age					
Traditional	1,194	1.66	1.79	-.01	-0.142
Nontraditional	171	1.68	1.91		
Gender					
Female	777	1.60	1.74	-.09	-1.514[a]
Male	588	1.75	1.88		
Ethnicity					
Black	108	2.07	1.75	.25	2.593*
White	1,114	1.50	1.81		
Academic Intent					
Occupational	517	1.77	1.97	.07	1.575[a]
Transfer	848	1.60	1.69		
Financial Aid Eligibility					
Not Eligible	788	1.60	1.78	-.07	-1.482
Eligible	577	1.75	1.83		

Note. [a]An adjusted *t* value is reported based on unequal variances of the subgroups.

*p < .05.

Table 7

Number of Course Adds Made to the Fall Schedule

Group	n	M	SD	d	t
Age					
Traditional	1,194	0.80	1.30	-.17	-1.924[a]
Nontraditional	171	1.04	1.53		
Gender					
Female	777	0.83	1.30	-.01.	-0.261
Male	588	0.85	1.37		
Ethnicity					
Black	108	0.82	1.20	-.01	-0.040
White	1,114	0.83	1.35		
Academic Intent					
Occupational	517	0.93	1.44	.11	1.975*[a]
Transfer	848	0.78	1.25		
Financial Aid Eligibility					
Not Eligible	788	0.86	1.37	.04	0.679
Eligible	577	0.81	1.27		

Note. [a]An adjusted t value is reported based on unequal variances of the subgroups.

*$p < .05$.

Table 8

Number of Course Section Changes Made to the Fall Schedule

Group	n	M	SD	d	t
Age					
Traditional	1,194	0.30	0.73	-.12	-1.428[a]
Nontraditional	171	0.40	0.84		
Gender					
Female	777	0.36	0.78	.12	2.432*[a]
Male	588	0.26	0.69		
Ethnicity					
Black	108	0.33	0.67	.06	0.492
White	1,114	0.30	0.72		
Academic Intent					
Occupational	517	0.31	0.74	-.01	-0.159
Transfer	848	0.32	0.74		
Financial Aid Eligibility					
Not Eligible	788	0.31	0.73	-.01	-0.449
Eligible	577	0.32	0.76		

Note. [a]An adjusted t value is reported based on unequal variances of the subgroups.

*$p < .05$.

Results from the three sets of analyses indicated that 3 of the 15 tests conducted resulted in the finding of a significant difference in mean number of type of course schedule changes made by subgroups of students. Table 6 indicates that Black students had a statistically significant larger mean number of course drops (2.07) than White students (1.60). Table 7 indicates that occupational students had a statistically significant larger mean number of course adds (.93) than transfer students (.78). Finally, Table 8 indicates that female students had a statistically significant larger mean number of course section changes (.36) than male students (.26).

Based on these results, the researcher was able to reject each of the following sub-hypotheses related to the third main research hypothesis:

III (a) 3 - There is no relationship between student ethnicity and the number of course drops students make to their fall course schedule.

III (b) 4 - There is no relationship between student academic intent and the number of course adds students make to their fall course schedule.

III (c) 2 - There is no relationship between student gender and the number of course section changes students make to their fall course schedule.

The fourth main research hypothesis examined when students made changes to their fall course schedule. This hypothesis was tested by examining the proportion of course drops, adds, and section changes that were made early in the add-drop period. Table 9 presents the results of independent samples t-tests conducted on these variables. Data for the variable, RLY_S_CH (the proportion of course schedule changes made early in the add-drop period) had unequal variances for several of the sets of subgroups, based on Levene's Test ($p < .05$). As a result, an adjusted t-value was reported for those tests. Results from these tests indicated a statistically significant difference in mean proportion of course schedule changes made early in the add-drop period for three of the five sets of subgroups studied.

Table 9

Proportion of Schedule Changes Made in the Early Add-Drop Period

Group	n	M	SD	d	t
Age					
Traditional	908	.490	.423	-.02	-0.197
Nontraditional	134	.497	.428		
Gender					
Female	598	.532	.428	.24	3.734***[a]
Male	444	.435	.410		
Ethnicity					
Black	95	.362	.415	-.34	-3.169**[a]
White	829	.506	.420		
Academic Intent					
Occupational	387	.498	.420	.04	0.436
Transfer	655	.486	.425		

(table continues)

Table 9 (continued)

Group	n	M	SD	d	t
Financial Aid Eligibility					
Not Eligible	594	.539	.422	.27	4.336***
Eligible	448	.426	.417		

Note. [a]An adjusted t value is reported based on unequal variances of the subgroups.

$^{**}p < .01$; $^{***}p < .001$.

Female students averaged making 53.2% of their course schedule changes early in the add-drop period as compared to male students who averaged making less than 43.5% of their schedule changes during the early add-drop period. White students averaged making 50.6% of their course schedule changes early in the add-drop period as compared to Black students who averaged making 36.2% of their schedule changes early in the add-drop period. Finally, students not eligible for financial aid averaged making 53.9% of their course schedule changes early in the add-drop period as compared to students who were eligible for financial aid made 42.6% of their schedule changes early in the add-drop period.

Based on these results, the researcher was able to reject three of the sub-hypotheses related to the fourth main research hypothesis:

IV (b) - There is no relationship between student gender and when students make changes to their fall course schedule.

IV (c) - There is no relationship between student ethnicity and when students make changes to their fall course schedule.

IV (e) - There is no relationship between student financial aid eligibility and when students make changes to their fall course schedule.

The researcher was unable to reject the two other sub-hypotheses related to the fourth main research hypothesis:

IV (a) - There is no relationship between student age and when students make changes to their fall course schedule.

IV (d) - There is no relationship between student academic intent and when students make changes to their fall course schedule.

Findings Related to Enrollment and Registration Behaviors

Research hypothesis V was related to research question two that asked if there were interrelationships among the enrollment and registration behaviors investigated in this study. Correlations were identified to compare the specific enrollment and registration behaviors to note any statistically significant relationships. Because the data were not normally distributed for these behaviors, a Spearman rank-order correlation coefficient was calculated for each of the relationships investigated. Table 10 indicates the association between the variables using the Spearman rank-order correlation coefficient.

Table 10

Spearman Rank-Order Correlation Coefficients for Enrollment and Registration Behaviors

Variable	DAYS_RG	T_#_CHG	DROPS	ADDS	SEC CHNGS
DAYS_RG					
T_#_CHG	.004				
DROPS	-.016	.876**			
ADDS	.088**	.702**	.430**		
SEC CHNGS	.052	.406**	.130**	.210**	
RLY_S_CH	.225**	.221**	-.171**	.532**	.303**

**$p < .01$.

As indicated in Table 10, of the 15 Spearman rank-order correlations calculated, 12 were determined to be statistically significant. Table 10 indicates statistically significant r_s values ranging from .876 ($p < .01$) to .088 ($p < .01$). An explanation of these values follows.

A statistically significant relationship was identified between when a student initially enrolled for the semester and the number of course adds ($r_s = .088$, $p < .01$) but the small size of the correlation coefficient signals that the variables are not correlated strongly. A statistically significant relationship was also found between when a student initially enrolls for the semester and the proportion of changes made in the early add-drop period ($r_s = .225$, $p < .01$) suggesting that the earlier students initially enroll for the fall semester, the more likely they are to make changes to their schedule early in the add-drop period. Moreover, the practical relationship between the variables is significant because students who register for courses late cannot make changes to their course schedule early in the add-drop period. For example, students who wait until the first week of the semester to enroll for courses cannot make any changes to their schedule in the early add-drop period because they are already beyond that period in the semester.

The variable, total number of schedule changes was found to be significantly correlated with all the other enrollment and registration variables: number of course drops ($r_s = .876$, $p < .01$), number of course adds ($r_s = .702$, $p < .01$), number of course section changes ($r_s = .406$, $p < .01$), and proportion of schedule changes made early in the add-drop period ($r_s = .221$, $p < .01$). The strong correlation of total number of schedule changes with the variables total number of drops, adds, and section changes was expected since the combination of data values for number of drops, adds, and section changes actually determined the data value for total number of schedule changes. The weak correlation of total number of schedule changes with proportion of changes made early in the add-drop period indicated that as the number of total schedule changes increased, a higher number of them were made early in the add-drop period. While this result is statistically significant, in practical terms it is of modest importance, signaling that the variables are not very strongly related.

The variable, number of course drops, was found to have a statistically significant relationship with number of course adds ($r_s = .430$, $p < .01$) suggesting that a significant number of students that drop courses also add courses. The considerably weaker relationship with number of course section changes ($r_s = .130$, $p < .01$) and proportion of changes made in the early add-drop period ($r_s = -.171$, $p < .01$) indicate a correlation of small size, signaling that the variables are not very strongly related.

The variable, number of course adds, was found to have a statistically significant relationship with number of course section changes ($r_s = .210$, $p < .01$) but this correlation was weak suggesting that the variables are not very strongly related. However, the larger correlation between number of course adds and proportion of schedule changes made in the early add-drop period ($r_s = .532$, $p < .01$) was expected since nearly all course adds are limited to the first week of classes and the time period prior to the start of the academic semester. Course adds made later than this time period required the approval of the faculty member for the specific course.

Finally, the variable, proportion of schedule changes made in the early add-drop period, was found to have a statistically significant relationship with number of course section changes ($r_s = .303$, $p < .01$), indicating that larger numbers of section changes were accompanied with more course schedule changes made in the early add-drop period. The modest correlation, however, implies that the variables were not strongly related.

Based on these results, the researcher was able to reject hypothesis V - There is no interrelationship among the enrollment and registration behaviors investigated in this study.

Findings Related to Academic Outcomes

Descriptive information related to fall semester grade point average, fall semester course completion, and student attrition is presented in Tables 11 through 17. These results were related to the subgroups of students defined according to the characteristics investigated in this study.

Table 11

Fall Semester Grade Point Average by Student Subgroup

Group	n	M	SD	d	t
Age					
Traditional	1,194	3.13	1.37	-.06	-0.630[a]
Nontraditional	171	3.22	1.74		
Gender					
Female	777	3.23	1.41	.14	2.548*
Male	588	3.03	1.42		
Ethnicity					
Black	108	2.41	1.52	-.57	-5.438***[a]
White	1,114	3.24	1.38		
Academic Intent					
Occupational	517	2.99	1.52	-.17	-2.987**[a]
Transfer	848	3.24	1.34		
Financial Aid Eligibility					
Not Eligible	788	3.31	1.29	.28	4.961***[a]
Eligible	577	2.92	1.55		

Note. [a] An adjusted t value is reported based on unequal variances of the subgroups.

*p < .05; **p < .01; ***p < .001.

Results from Table 11 indicate significant differences in fall semester GPA between all the pairs of student subgroups except age. Female students, on average, earned a higher GPA than male students, White students earned a higher GPA than Black students, students with a transfer major earned a higher GPA than students with an occupational major, and students not eligible for financial aid earned a higher GPA than students who were eligible for financial aid. Students who were of traditional age did not earn a statistically significant different GPA than students who were of nontraditional age. Table 12 indicates the results of fall semester course completion by the same student subgroups.

Table 12

Fall Semester Course Completion by Student Subgroup

Group	n	M	SD	d	t
Age					
Traditional	1,194	.623	.356	.16	1.824[a]
Nontraditional	171	.564	.398		
Gender					
Female	777	.628	.360	.08	1.507
Male	588	.598	.364		

(table continues)

Table 12 (continued)

Group	n	M	SD	d	t
Ethnicity					
Black	108	.357	.343	-.83	-8.132***
White	1,114	.646	.353		
Academic Intent					
Occupational	517	.602	.384	-.06	-1.069[a]
Transfer	848	.624	.347		
Financial Aid Eligibility					
Not Eligible	788	.670	.335	.36	6.555***[a]
Eligible	577	.540	.383		

Note. [a]An adjusted t value is reported based on unequal variances of the subgroups.

***$p < .001$.

Results from Table 12 indicate a significant difference in fall semester course completion between two of the pairs of student subgroups. White students had a larger proportion of course completion during the fall semester than Black students did and students not eligible for financial aid had a larger proportion of course completion than students who were eligible for financial aid. There were no statistically significant differences found in course completion for the subgroups, age, gender, and academic intent.

Table 13

Attrition by Student Age Subgroup

Age Subgroup	Students Not Enrolled in Spring Semester		Students Enrolled in Spring Semester	
	n	Percentage	n	Percentage
Traditional	227	82.8%	967	88.6%
Nontraditional	47	17.2%	124	11.4%

Table 13 indicates that a larger percentage of students that enrolled in spring semester courses were of traditional-age when compared to the percentage of students by age category who did not enroll in spring semester courses. This was found to be statistically significant, χ^2 (1, n = 1,365) = 6.694, p = .010.

Table 14

Attrition by Student Gender Subgroup

Gender Subgroup	Students Not Enrolled in Spring Semester		Students Enrolled in Spring Semester	
	n	Percentage	n	Percentage
Female	148	54.0%	629	57.7%
Male	126	46.0%	462	42.3%

Table 14 indicates that a very small difference was found in the percentage of students enrolling in spring semester courses that were female when compared to the percentage of students by gender category who did not enroll in the spring semester. This was not found to be statistically significant, χ^2 (1, n = 1,365) = 1.183, p = .277.

Table 15

Attrition by Student Ethnicity Subgroup

Ethnicity Subgroup	Students Not Enrolled in Spring Semester		Students Enrolled in Spring Semester	
	n	Percentage	n	Percentage
Black	34	13.9%	74	7.6%
White	210	86.1%	904	92.4%

Table 15 indicates that a larger percentage of White students enrolled in spring semester courses when compared to the percentage of students by ethnicity that did not enroll in spring semester courses. This was found to be statistically significant, χ^2 (1, n = 1,222) = 9.829, p = .002.

Table 16

Attrition by Student Academic Intent Subgroup

Academic Intent Subgroup	Students Not Enrolled in Spring Semester		Students Enrolled in Spring Semester	
	n	Percentage	n	Percentage
Occupational	124	45.3%	393	36.0%
Transfer	150	54.7%	698	64.0%

Table 16 indicates that a larger percentage of transfer major students enrolled in spring semester courses when compared to the percentage of students by academic intent that did not enroll in spring semester courses. This was found to be statistically significant, χ^2 (1, n = 1,365) = 7.935, p = .005.

Table 17

Attrition by Student Financial Aid Eligibility Subgroup

Financial Aid Subgroup	Students Not Enrolled in Spring Semester		Students Enrolled in Spring Semester	
	n	Percentage	n	Percentage
Not Eligible	129	47.1%	659	60.4%
Eligible	145	52.9%	432	39.6%

Table 17 indicates that a larger percentage of students not eligible for financial aid enrolled in spring semester courses when compared to the percentage of students by financial aid eligibility that did not enroll in spring semester courses. This was found to be statistically significant, χ^2 (1, n = 1,365) = 15.930, p = .000.

Overall, Tables 13 through 17 indicate that significant differences exited between the characteristics of student who did enroll for spring semester course as compared to students who did not enroll for spring semester classes. Students who were of traditional age, White, a transfer major, and not eligible for financial aid were more likely to enroll in spring semester classes. The only characteristic found that did not have any statistically significant difference for attrition was the gender of the student.

The sixth main research hypothesis and its related sub-hypotheses were related to research question three and sought to determine if there were interrelationships among the academic outcomes investigated in this study. A correlation coefficient was utilized to compare fall semester GPA with fall semester course completion for students who earned a semester GPA of more than 0.00. Since the data were not normally distributed for these variables, a Spearman rank-order correlation coefficient between the variables was investigated. Results indicated that a statistically significant relationship existed between the two variables ($r_s = .544$, $p <..001$, $n = 1{,}228$). This correlation indicated that as fall semester GPA increased, so did the proportion of credit hours that students completed for the fall semester. These findings allowed the researcher to reject the null sub-hypothesis VI (a) - There is no relationship between fall semester GPA and fall semester course completion.

To determine the relationship between student GPA and attrition, independent samples t-tests were conducted on these variables. Data for the variable fall semester GPA had unequal variance for the subgroups studied, based on Levene's Test ($p < .05$). As a result, an adjusted t-value was reported. Table 18 presents the results from this test indicating a statistically significant difference in the mean fall semester GPA of students who did not enroll in classes for the spring semester as compared to those that did enroll ($M = 1.71$ compared to $M = 3.50$).

Table 18

Fall Semester Grade Point Average (n = 1,228)

Group	n	M	SD	d	t
Attrition for Spring Semester					
Did not enroll	184	2.54	1.32	-1.04	-11.141***[a]
Did enroll	1,044	3.66	0.83		

Note. [a]An adjusted t-value is reported based on unequal variance of the subgroups.

$***p < .001$.

These results allowed the researcher to reject the null sub-hypothesis VI (b) - There is no relationship between fall semester GPA and attrition.

An alternative analysis of the relationship between GPA and attrition was also conducted after 137 students were removed from the sample. These students were unique from the rest of the sample (n = 1,228) because they dropped all of their classes for the fall semester earning a GPA of 0.00. To the extent that GPA is considered a measure of academic performance, students who drop all of their classes could be considered not to have any academic performance to measure. Using this interpretation of GPA, an analysis of the relationship between GPA and attrition would be more meaningful by removing from that analysis those students who did not complete any courses. Table 19 provides descriptive information on the 137 students removed from the sample for the alternative analysis.

Table 19

Characteristics and Attrition for Students With 0.00 GPA by Student Subgroup

Group	n	# of Students not Enrolling in Spring Semester	# of Students Enrolling Spring Semester
Age			
Traditional	111	73	38
Nontraditional	26	17	9
Gender			
Female	75	46	29
Male	62	44	18
Ethnicity			
Black	19	12	7
White	98	65	33
Academic Intent			
Occupational	63	39	24
Transfer	74	51	23
Financial Aid Eligibility			
Not Eligible	60	41	19
Eligible	77	49	28

The results shown in Table 19 indicate that 47 of the students that dropped all of their fall semester courses did enroll in for the spring academic semester. However, no other analyses were conducted on the 137 students because that was outside the scope of the present study.

Table 20 presents the results from an independent samples t-test for the alternative analysis that did not include the 137 students with 0.00 GPAs. Data for the variable, semester GPA had unequal variance for the subgroups studied, based on Levene's Test ($p < .05$). As a result, an adjusted t-value was reported.

Table 20

GPA of Students Completing the Fall Semester (n = 1,228)

Group	n	M	SD	d	t
Attrition for Spring Semester					
Did not enroll	184	2.54	1.32	-1.04	-11.141^{***a}
Did enroll	1,044	3.66	0.831		

Note. [a]An adjusted t-value was reported based on unequal variance of the subgroups.

$^{***}p < .001$.

As indicated in Table 20, there was still a statistically significant difference in the mean GPA of students who did not enroll in classes for the spring semester as compared to those that did enroll. Students who enrolled in spring semester courses averaged a GPA of 3.66 as compared to a mean GPA of 2.54 for students who did not enroll in spring courses.

To determine the relationship between student fall semester course completion and attrition, independent samples t-tests were conducted on these variables. Data for the variable, fall semester course completion had unequal variance for the subgroups studied, based on Levene's Test ($p < .05$). As a result, an adjusted t-value was reported. Table 21 presents the results from this test indicating a statistically significant difference in the mean proportion of fall course completion for students who did not enroll in classes for the spring semester as compared to those that did enroll.

Table 21

Fall Semester Course Completion (n = 1,365)

Group	n	M	SD	d	t
Attrition for Spring Semester					
Did not enroll	274	.253	.341	-1.40	-20.087***^{a}
Did enroll	1,091	.706	.305		

Note. ^{a}An adjusted t-value was reported based on unequal variance of the subgroups.

***$p < .001$.

These findings allowed the researcher to reject the sub-hypothesis VI (c) – There is no relationship between fall semester course completion and attrition.

The seventh main research hypothesis was related to research question four and sought to determine if enrollment and registration behaviors could predict the three academic outcomes investigated in this study. Multiple linear regression analysis was used to investigate the sub-hypotheses for the academic outcomes, fall semester GPA and fall semester course completion. The third academic outcome variable, attrition, was dichotomous so a logistic regression analysis was conducted to investigate that sub-hypothesis.

The multiple regression model used to determine the ability of enrollment and registration behaviors to predict fall semester GPA was the stepwise method in order to determine the best combination of enrollment and registration behaviors that were predictors of fall semester GPA. Table 22 provides a summary of the regression models developed from the analysis of the six enrollment and registration variables (predictor) and one outcome variable: fall semester GPA. The variable, proportion of schedule changes made in the early add-drop period limited the sample to $\underline{n} = 1{,}053$ since 312 students had no data values for this field due to the absence of course changes to their fall schedule. The regression model was developed by loading all of the predictor variables into block 1: when student initially enrolled, total number of schedule changes, number of course drops, number of course adds, number of course section changes, and proportion of schedule changes made in the early add-drop period. The criteria for stepwise inclusion or exclusion of the predictor variables was based on probability-of-$\underline{F}$-to enter < = .050 and probability-of-$\underline{F}$-to remove > = .100.

Table 22

Multiple Regression Model Summary for GPA by Enrollment and Registration Behaviors (n = 1,053)

Model	R	R Square	Std error of Estimate	F	df	Sig.
1[a]	.433	.188	1.35	242.98	1, 1051	.000
2[b]	.593	.351	1.21	284.26	2, 1050	.000
3[c]	.605	.367	1.20	202.34	3, 1049	.000
4[d]	.613	.376	1.19	157.71	4, 1048	.000

[a] Predictors: (Constant), DROPS

[b] Predictors: (Constant), DROPS, ADDS

[c] Predictors: (Constant), DROPS, ADDS, RLY_S_CH

[d] Predictors: (Constant), DROPS, ADDS, RLY_S_CH, DAYS_RG

As shown in Table 22, the regression model best able to predict fall semester GPA from enrollment and registration behaviors was Model 4. This model included four of the six enrollment and registration variables: number of course drops, number of course adds, proportion of schedule changes made in the early add-drop period, and when the student initially enrolled. Therefore, according to the findings for this portion of the study, it can be concluded that 37.6% of the total variation in students' fall semester GPA could be accounted for by a combination of four enrollment and registration behaviors: the number of course drops, the number of course adds, the proportion of course schedule changes made early in the add-drop period, and the date the student initially enrolled.

Table 23 provides regression coefficient information on all of the included variables for Model 4 of this regression analysis.

Table 23

Multiple Regression Analysis With GPA as the Outcome Variable (n = 1,053)

Variable	B	SE B	ß	t
(Constant)	3.114	.096		32.278***
DROPS	-0.496	.025	-.587	-19.711***
ADDS	0.382	.035	.362	10.869***
RLY_S_CH	0.447	.108	.126	4.134***
DAYS_RG	0.003	.001	.099	3.931***

***$p < .001$.

Based on these results, the researcher was able to reject the sub-hypothesis VI (a) - Student enrollment and registration behaviors do not predict fall semester GPA. The findings from this portion of the study indicated that for each one-course increase in course drops, fall semester GPA would be decreased by .496 if the other independent variables were held constant. Similarly, for each one-course increase in course adds, fall semester GPA would be increased by

.382. Making all as opposed to none of one's course schedule changes in the early add-drop period would result in fall semester GPA being increased by .447. Finally, for each one-day increase in when a student initially enrolled in relation to the start of the fall semester, fall semester GPA would be increased by .003. The best multiple regression equation for predicting 37.6% of the variation in fall semester GPA used a constant value of 3.114, subtracting .496 times the number of course drops, adding .382 times the number of course adds, adding .447 when all schedule changes were made early in the add-drop period, and adding .003 times the number of days that a student initially registered in relation to the start of the fall semester. The enrollment and registration behaviors, total number of course schedule changes and number of course section changes had no statistically significant association with fall semester GPA once the other variables were accounted for.

Discussed earlier in this chapter was an alternative interpretation for the analysis of the variable, fall semester GPA. To the extent that GPA is considered a measure of academic performance, students who dropped all of their fall courses and earned a GPA of 0.00 were omitted from this alternative regression analysis. The removal of these 137 students would allow for the investigation of the association between enrollment and registration behaviors and students who did not drop all of their courses for the fall semester and earned a GPA above 0.00. Table 24 provides information on the multiple regression analysis conducted for this alternative sample.

Table 24

Multiple Regression Summary of GPA by Enrollment and Registration Behaviors for Students who Earned Above 0.00 GPA (n = 917)

Model	R	R Square	Std Error of Estimate	F	df	Sig.
1[a]	.304	.092	.999	93.16	1, 915	.000
2[b]	.362	.131	.979	69.06	2, 914	.000
3[c]	.392	.154	.966	55.40	3, 913	.000
4[d]	.401	.161	.963	43.66	4, 912	.000

[a] Predictors: (Constant), RLY_S_CH

[b] Predictors: (Constant), RLY_S_CH, DROPS

[c] Predictors: (Constant), RLY_S_CH, DROPS, ADDS

[d] Predictors: (Constant), RLY_S_CH, DROPS, ADDS, DAYS_RG

Table 24 presents a model that is significantly different from the model in Table 22 in terms of its strength of prediction (R Square of .376 compared to .161) and the order in which the variables are included in the model. This alternative model indicates the association of enrollment and registration behaviors with fall semester GPA for students who earned above a 0.00 grade point average.

Table 25 provides regression coefficient information on all of the included variables for Model 4 of this regression analysis.

Table 25

Multiple Regression Analysis With GPA as the Outcome Variable for Students who Earned Above 0.00 GPA (n = 917)

Variable	B	SE B	ß	t
(Constant)	3.193	.084		32.278***
RLY_S_CH	0.467	.091	.189	5.157***
DROPS	-0.221	.026	-.329	-8.344***
ADDS	0.165	.032	.226	5.143***
DAYS_RG	0.002	.001	.084	2.702***

***$p < .001$.

The findings from this portion of the study indicated that making all as opposed to none of one's schedule changes in the early add-drop period would result in fall semester GPA being increased by .467 if the other independent variable were held constant. Similarly, for each one-course increase in course drops, fall semester GPA would be decreased by .221. For each one-course increase in course adds, fall semester GPA would be increased by .165. Finally, for each one-day increase in when a student initially enrolled in relations to the start of the fall semester, fall semester GPA would be increased by .002. The best multiple regression equation for predicting 16.1% of the variation in fall semester GPA used a constant value of 3.193, adding .467 when all schedule changes were made early in the add-drop period, subtracting .221 times the number of course drops, adding .165 times the number of course adds, and adding .002 times the number of days that a student initially registered in relation to the start of the fall semester. The enrollment and registration behaviors, total number of course schedule changes and number of course section changes had no statistically significant association with fall semester GPA once the other variables were accounted for.

The multiple regression model developed to determine the ability of enrollment and registration behaviors to predict fall semester course completion was developed through the stepwise method. Table 26 provides a summary of the regression models developed from the analysis of the six enrollment and registration variables (predictor) and one outcome variable: fall semester course completion. The variable, proportion of schedule changes made in the early add-drop period, limited the sample to n = 1,053 since 312 students had no data values for this variable due to the absence of course changes to their fall schedule. The regression model was developed by loading all of the predictor variables into block 1: when student initially enrolls, total number of schedule changes, number of course drops, number of course adds, number of course section changes, and proportion of schedule changes made in the early add-drop period. The criteria for stepwise inclusion or exclusion of the predictor variables was based on probability-of-F-to enter < = .050 and probability-of-F-to remove > = .100.

Table 26

Multiple Regression Model Summary for Fall Semester Course Completion by Enrollment and Registration Behaviors (n = 1,053)

Model	R	R Square	Std Error of Estimate	F	df	Sig.
1[a]	.487	.237	.322	326.10	1, 1051	.000
2[b]	.651	.424	.280	385.90	2, 1050	.000
3[c]	.685	.469	.269	309.06	3, 1049	.000
4[d]	.697	.486	.264	248.07	4, 1048	.000

[a] Predictors: (Constant), RLY_S_CH

[b] Predictors: (Constant), RLY_S_CH, DROPS

[c] Predictors: (Constant), RLY_S_CH, DROPS, ADDS

[d] Predictors: (Constant), RLY_S_CH, DROPS, ADDS, DAYS_RG

As shown in Table 26, the best regression model for predicting variation in fall semester course completion from enrollment and registration behaviors was Model 4. This model included four of the six enrollment and registration variables: proportion of schedule changes made in the early add-drop period, number of course drops, number of course adds, and when a student initially enrolled in relation to the start of the fall semester. Therefore, according to the data analyzed in this portion of the study, it can be concluded that 48.4% of the total variation in students' fall semester course completion could be accounted for by a combination of four enrollment and registration behaviors: the proportion of course schedule changes made in the early add-drop period, the number of course drops, the number of course adds, and the date that the student initially enrolled.

Table 27 provides regression coefficient information on all of the included variables for Model 4 of this regression analysis.

Table 27

Multiple Regression Analysis With Fall Semester Course Completion as the Outcome Variable (n = 1,053)

Variable	B	SE B	ß	t
(Constant)	.531	.021		24.731***
RLY_S_CH	.228	.024	.262	9.482***
DROPS	-.122	.006	-.588	-21.774***
ADDS	.077	.008	.297	9.826***
DAYS_RG	.001	.000	.135	5.918***

***$p < .001$.

The findings from this portion of the study indicated that making all as opposed to none of one's schedule changes in the early add-drop period would result in fall semester course completion being increased by .228 if the other independent variables were held constant. Similarly, for each one-course increase in course drops, fall semester course completion would be decreased by .122. For each one-course increase in course adds, fall semester course completion would be increased by .077. Finally, for each one-day increase in when a student initially enrolls in relation to the start of the fall semester, fall semester course completion would be increased by .001. The best multiple regression equation for predicting 48.6% of the variation in course completion used a constant value of .531, adding .228 when all schedule changes were made early in the add-drop period, subtracting .122 times the number of course drops, adding .077 times the number of course adds, and adding .001 times the number of days that a student initially registered in relation to the start of the fall semester. The enrollment and registration behaviors, total number of course schedule changes and number of course section changes had no statistically significant association with fall semester course completion once the other variables were accounted for. Based on these results, the researcher was able to reject the sub-hypothesis VI (b) - Student enrollment and registration behaviors do not predict fall semester course completion.

Before a logistic regression model was developed to determine the ability of enrollment and registration behaviors to predict attrition, the relationship of those behaviors with attrition was investigated. Table 28 presents the results of independent samples t-tests conducted on these variables. Data for the variables, when a student initially enrolled for the fall semester, total number of schedule changes, number of course drops, and proportion of schedule changes made in the early add-drop period had unequal variances for the sets of subgroups, based on the Levene's Test ($p < .05$). As a result, an adjusted t-value was reported for those tests.

Table 28

Comparison of Enrollment and Registration Behaviors for Attrition Subgroups

Behavior	Attrition Sub-group	n	M	SD	d	t
When initially enrolled						
	0	274	69.86	53.06	-.58	-8.216***[a]
	1	1,091	98.68	47.08		
Total # of Changes						
	0	274	4.18	3.16	.57	8.156***[a]
	1	1,091	2.47	2.80		
# of Course Drops						
	0	274	3.03	2.14	.93	12.401***[a]
	1	1,091	1.32	1.53		
# of Course Adds						
	0	274	0.88	1.39	.04	0.578
	1	1,091	0.82	1.32		
# of Section Changes						
	0	274	0.27	0.69	-.07	-0.995
	1	1,091	0.32	0.75		

(table continues)

Table 28 (continued)

Behavior	Attrition Sub-group	n	M	SD	d	t
Proportion of early change	0	247	0.32	0.34	-.59	-8.591***[a]
	1	806	0.54	0.43		

Note. 0 = Did not enroll for spring semester; 1 = Did enroll for spring semester. [a]An adjusted t value was reported based on unequal variances of the subgroups.

***$p < .001$.

Data in Table 28 indicate several significant differences in mean enrollment and registration behavior when comparing students who enrolled for the spring semester with students not enrolled for the spring semester. Based on the findings in Table 28, students who enrolled in the spring semester averaged initial enrollment for fall semester classes nearly 29 days earlier than students not enrolled for the spring semester. Students enrolled in the spring semester averaged making significantly fewer changes to their fall semester course schedule (2.47) as compared to students not enrolled for the spring semester (4.18). Students enrolled in the spring semester averaged making significantly fewer course drops (1.32) than students not enrolled for the spring semester (3.03). Finally, students enrolled in the spring semester averaged making a larger proportion of their schedule changes early in the add-drop period

(54.4%) than students not enrolled for the spring semester (31.5%).

The logistic regression model used to determine the ability of enrollment and registration behaviors to predict student attrition measured for the spring semester was developed by using the forward likelihood-ratio (LR) method. Table 29 provides a summary of the estimated regression coefficients and related statistics from the logistic regression model that best predicts the odds of student attrition from a constant and the variables: number of course drops, number of course adds, and when a student initially enrolls for the fall semester. As in the multiple linear regressions conducted earlier, the variable, proportion of schedule changes made in early add-drop period, limited the sample to $\underline{n} = 1{,}053$ since 312 students had no data values for this field due to the absence of changes to their fall course schedule. The logistic regression model was developed by loading all of the predictor variables into block 1: when a student initially enrolled for the fall semester, total number of schedule changes, number of course drops, number of course adds, number of course section changes, and proportion of schedule changes made in the early add-drop period. The criterion for the forward LR test inclusion of the predictor variables was based on the significance level of the chi square for the change in -2 log-likelihood increase of < = .050 and the -2 log-likelihood decrease of > = .100.

Table 29

Logistic Regression Analysis With Attrition as the Outcome Variable
(n = 1,053)

Variable	B	SE B	Wald	df	Exp (B)
DROPS	-0.708	.056	158.949	1	0.493***
ADDS	0.472	.070	45.62	1	1.603***
DAYS_RG	0.012	.002	55.20	1	1.012***
(Constant)	1.406	.186	57.20	1	4.079***

***$p < .001$.

Results in Table 29 indicate that for each additional course dropped during the fall semester, the odds of enrolling for the spring semester decreased by 50.7% (.493 is .507 less than 1). The results also indicate that for each additional course added during the fall semester, the odds of enrolling for the spring semester increase by 60.3%. Finally, the results show that for each additional day earlier that a student initially enrolls for the fall semester, the odds of enrolling for the spring semester increase by 1.2%.

As shown in Table 30, the logistic regression model best able to predict student attrition from enrollment and registration behaviors was Model 3. This model included three of the six enrollment and registration variables: number of courses dropped, when a student initially enrolled, and number of course adds.

Table 30

Logistic Regression Model Summary for Attrition by Enrollment and Registration Behaviors (n = 1,053)

Step	-2 Log Likelihood	Chi-square	df	Sig.
1[a]	1008.98	138.237	1	.000
2[b]	934.68	74.301	1	.000
3[c]	881.86	52.814	1	.000

Note. Initial –2 Log Likelihood: 1147.216

[a] Variable entered on step 1: DROPS.

[b] Variable entered on step 2: DAYS_RG.

[c] Variable entered on step 3: ADDS.

Table 31 provides information on the comparison of model predictions with actual observed outcomes as indicated by the results. These findings indicate the model's significant ability to correctly predict those students who do enroll in the spring semester but the model is considerably weaker in predicting those students who do not enroll in the spring.

Table 31

Classification Table for Logistic Regression Model 3 (n = 1,053)

	Predicted n		Predicted
	Not Enrolled for	Enrolled for	Percentage
Observed	Spring Semester	Spring Semester	Correct
Attrition			
Not Enrolled = 247	111	136	44.9%
Enrolled = 806	43	763	94.7%
Overall percentage			83.0%

Based on these results depicted in Tables 29, 30, and 31, the researcher was able to reject the sub-hypothesis VII (c) - Student enrollment and registration behaviors do not predict attrition. The findings from this portion of the study indicated that a combination of three student enrollment and registration behaviors had a moderate association with student attrition. The number of course drops, the number of course adds, and the number of days in relation to the start of the fall semester that a student initially enrolled in combination were each associated with predicting the odds of student attrition. The enrollment and registration behaviors, total number of course schedule changes, number of course section changes, and proportion of course schedule changes made early in the add-drop period had no statistically significant association with student attrition once the other variables were accounted for.

The eighth main research hypothesis was related to research question five and sought to determine if, when controlling for student characteristics, student enrollment and registration behaviors could predict the three academic outcomes investigated in this study. Multiple linear regression analysis was used to investigate this hypothesis for the academic outcomes of fall semester GPA and fall semester course completion. The third academic outcome variable, attrition, was dichotomous so a logistic regression analysis was conducted to investigate that portion of the hypothesis.

Table 32 provides a summary of the regression models developed from the analysis of the five control variables, the six enrollment and registration variables and the one outcome variable: fall semester GPA. The variables, student ethnicity and proportion of schedule changes made in the early add-drop period limited the sample to $\underline{n} = 932$ since 432 students were not included due to a combination of no changes made the fall course schedule and not being categorized as Black or White for ethnicity. The regression model was developed by forcing all of the control variables into block 1: age category, gender, ethnicity, academic intent, and financial aid eligibility. The predictor variables were loaded into block 2: when student initially enrolled for the fall semester, total number of schedule changes, number of course drops, number of course adds, number of course section changes, and proportion of schedule changes made in the early add-drop period. The criteria for stepwise inclusion or exclusion of the predictor variables in block 2 was based on probability-of-$\underline{F}$-to enter $< = .050$ and probability-of-$\underline{F}$-to remove $> = .100$.

Table 32

Multiple Regression Model Summary for GPA by Enrollment and Registration Behaviors With Student Characteristics Held Constant (n = 932)

Model	R	R Square	Std Error of Estimate	F	df	Sig.
1[a]	.255	.065	1.45	12.93	5, 926	.000
2[b]	.488	.238	1.31	48.25	6, 925	.000
3[c]	.622	.387	1.18	83.38	7, 924	.000
4[d]	.632	.399	1.16	76.64	8, 923	.000
5[e]	.636	.404	1.16	69.44	9, 922	.000

[a]Predictors: (Constant), AGE_CAT, GENDER, RACE, INTENT, FIN_AID

[b]Predictors: (Constant), AGE_CAT, GENDER, RACE, INTENT, FIN_AID, DROPS

[c]Predictors: (Constant), AGE_CAT, GENDER, RACE, INTENT, FIN_AID, DROPS, ADDS

[d]Predictors: (Constant), AGE_CAT, GENDER, RACE, INTENT, FIN_AID, DROPS, ADDS, RLY_S_CH

[e]Predictors: (Constant), AGE_CAT, GENDER, RACE, INTENT, FIN_AID, DROPS, ADDS, RLY_S_CH, DAYS_RG

As shown in Table 32, the regression model that best predicts the variation in fall semester GPA from enrollment and registration behaviors, above and beyond that determined by the control variables was Model 5. This model included four of the six enrollment and registration variables: proportion of schedule changes made in the early add-drop period, number of course drops, number of course adds, and when a student enrolls for the fall semester. Table 32 also shows that 6.5% of the total variation in a student's fall semester GPA could be accounted for by the combination of five student characteristics: age category, gender, ethnicity, academic intent, and financial aid eligibility. Therefore, by controlling for student characteristics, it can also be concluded that an additional 33.9% of the total variation in students' fall semester GPA could be accounted for by a combination of four enrollment and registration behaviors: the proportion of course schedule changes made early in the add-drop period, the number of course drops, the number of course adds, and the date that the student initially enrolled.

Table 33 provides regression coefficient information on all of the included variables for Model 5 of this regression analysis.

Table 33

Multiple Regression Model Coefficients for GPA by Enrollment and Registration Behaviors With Student Characteristics Held Constant (n = 932)

Variable	B	SE B	ß	t
(Constant)	2.775	.178		15.565***
AGE_CAT	0.260	.118	.060	2.211***
GENDER	-0.105	.080	-.035	-1.313
RACE	0.379	.129	.077	2.938**

(table continues)

Table 33 (continued)

Variable	B	SE B	ß	t
INTENT	0.289	.081	.094	3.561***
FIN_AID	-0.220	.085	-.073	-2.598**
DROPS	-0.478	.026	-.571	-18.377***
ADDS	0.366	.036	.352	10.123***
RLY_S_CH	0.430	.114	.121	3.787***
DAYS_RG	0.002	.001	.075	2.742**

**p < .01; ***p < .001.

Based on these results, the researcher was able to reject the sub-hypothesis VIII (a) - Controlling for student characteristics, enrollment and registration behaviors do not predict fall semester GPA. The findings of this portion of the study indicated that an additional 33.9% of the variance beyond the 6.5% of variance in fall semester GPA predicted from student characteristics could be predicted by a combination of four enrollment and registration behaviors. The enrollment and registration behaviors, total number of course schedule changes and number of course section changes, had no statistically significant association with fall semester GPA once the other variables were accounted for.

The findings from this portion of the study indicated that being of traditional-age was related to a .260 higher GPA when the other independent variables are held constant. Similarly, being White was related to a .379 higher GPA, being a transfer major was related to a .289 higher GPA, and being eligible for financial aid was associated with a .220 lower GPA. For the enrollment and registration behaviors, each one-course increase in course drops was related to a .478 lower GPA when other independent variables were held constant. Similarly, each one-course increase in course adds was related to a .366 increase in GPA, when all schedule changes were made in the early add-drop period related to a .430 increase in GPA, and finally, each one-day increase in when a student initially enrolled for the fall semester was related to a .002 higher GPA. The enrollment and registration behaviors, total number of course schedule changes and number of course section changes had no statistically significant association with fall semester GPA once the other variables were accounted for.

An alternative regression model is also presented at this time excluding 137 students who dropped all of their courses for the fall semester and therefore earned a GPA of 0.00. As discussed earlier, this alternative regression strategy would be consistent with certain interpretations of GPA. That is, to the extent that GPA is considered a measure of academic performance, students who dropped all of their fall courses and earned a GPA of 0.00 were omitted from this alternative regression analysis. The removal of these 137 students would allow for the investigation of the association between enrollment and registration behaviors and students who did not drop all of their courses for the fall semester and earned a GPA.

Table 34 provides a summary of the regression models developed from this alternative analysis of the five control variables, the six enrollment and registration variables (predictor) and the one outcome variable: fall semester GPA. The variables, ethnicity, proportion of schedule changes made in the early add-drop period, and semester GPA limited the sample to n = 816 since 549 students were not included due to a combination of no schedule changes for the fall semester, not being categorized as Black or White for ethnicity, and having earned a grade point average of 0.00 for the semester. The regression model was developed by forcing all of the control variables into block 1: age category, gender, ethnicity, academic intent, and financial aid eligibility. The predictor variables were loaded into block 2: when student initially enrolled, total number of schedule changes, number of course drops, number of course adds, number of course section changes, and proportion of changes made in the early add-drop period. The criteria for stepwise inclusion or exclusion of the predictor variables was based on probability-of-F-to enter < = .050 and probability-of-F-to remove > = .100.

Table 34

Alternative Multiple Regression Model Summary for GPA by Enrollment and Registration Behaviors With Student Characteristics Held Constant
(n = 816)

Model	R	R Square	Std Error of Estimate	F	df	Sig.
1[a]	.321	.103	1.007	18.61	5, 810	.000
2[b]	.426	.181	0.963	29.84	6, 809	.000
3[c]	.464	.215	0.943	31.62	7, 808	.000

(table continues)

Table 34 (continued)

Model	R	R Square	Std Error of Estimate	F	df	Sig.
4[d]	.487	.237	0.930	31.42	8, 807	.000

[a] Predictors: (Constant), AGE_CAT, GENDER, RACE, INTENT, FIN_AID

[b] Predictors: (Constant), AGE_CAT, GENDER, RACE, INTENT, FIN_AID, RLY_S_CH

[c] Predictors: (Constant), AGE_CAT, GENDER, RACE, INTENT, FIN_AID, RLY_S_CH, DROPS

[d] Predictors: (Constant), AGE_CAT, GENDER, RACE, INTENT, FIN_AID, RLY_S_CH, DROPS, ADDS

As shown in Table 34, the regression model that best predicted fall semester GPA from enrollment and registration behaviors, above and beyond that determined by the control variables was Model 4. This alternative model included three of the six enrollment and registration variables: proportion of schedule changes made in the early add-drop period, number of course drops, and number of course adds. Table 34 also shows that 10.3% of the total variation in students' fall semester GPA could be accounted for by the combination of five student characteristics: age category, gender, ethnicity, academic intent, and financial aid eligibility. Therefore, by controlling for student characteristics, according to the data analyzed in this portion of the study, it could also be concluded that an additional 13.4% of the total variation in students' fall semester GPA could be accounted for by a combination of three enrollment and registration behaviors: the proportion of course schedule changes made in the early add-drop period, the number of course drops, and the number of course adds.

Table 35 provides regression coefficient information on all of the included variables for Model 4 of this regression analysis.

Table 35

Alternative Multiple Regression Model Coefficients for GPA by Enrollment and Registration Behaviors With Student Characteristics Held Constant
(n = 816)

Variable	B	SE B	ß	t
(Constant)	2.876	.148		19.417***
AGE_CAT	0.522	.104	.166	5.009***
GENDER	-0.199	.068	-.093	-2.926**
RACE	0.418	.114	.115	3.673***
INTENT	0.307	.070	.141	4.370***
FIN_AID	-0.216	.072	-.100	-2.991**
RLY_S_CH	0.485	.092	.194	5.246***
DROPS	-0.208	.027	-.307	-7.716***
ADDS	0.157	.032	.216	4.875***

**$p < .01$; ***$p < .001$.

Based on these results for the alternative analysis, the researcher rejected the sub-hypothesis VIII (a) - Controlling for student characteristics, enrollment and registration behaviors do not predict fall semester grade point average. The enrollment and registration behaviors, total number of course schedule changes, number of days in relation to the start of the semester that a student initially enrolled, and number of course section changes, had no statistically significant association with fall semester GPA once the other variables were accounted for in this alternative regression model.

Table 36 provides a summary of the regression models developed from the analysis of the five control variables, the six enrollment and registration variables (predictor) and the one outcome variable: fall semester course completion. The variables, ethnicity and proportion of schedule changes made in the early add-drop period limited the sample to n = 932 since 433 students were not included due to a combination of no schedule changes for the fall semester and not being categorized as Black or White for ethnicity. The regression model was developed by forcing all of the control variables into block 1: age category, gender, ethnicity, academic intent, and financial aid eligibility. The predictor variables were loaded into block 2: when a student initially enrolled, total number of schedule changes, number of course drops, number of course adds, number of course section changes, and proportion of schedule changes made in the early add-drop period. The criteria for stepwise inclusion or exclusion of the predictor variables was based on probability-of-F-to enter < = .050 and probability-of-F-to remove > = .100.

Table 36

Multiple Regression Model Summary for Fall Semester Course Completion by Enrollment and Registration Behaviors with Student Characteristics Held Constant (n = 924)

Model	R	R Square	Std Error of Estimate	F	df	Sig.
1 [a]	.294	.086	.353	17.48	5, 926	.000
2 [b]	.550	.303	.309	67.01	6, 925	.000
3 [c]	.687	.472	.269	117.92	7, 924	.000
4 [d]	.719	.516	.257	123.24	8, 923	.000
5 [e]	.724	.525	.255	113.09	9, 922	.000

[a] Predictors: (Constant), AGE_CAT, GENDER, RACE, INTENT, FIN_AID

[b] Predictors: (Constant), AGE_CAT, GENDER, RACE, INTENT, FIN_AID, DROPS

[c] Predictors: (Constant), AGE_CAT, GENDER, RACE, INTENT, FIN_AID, DROPS, RLY_S_CH

[d] Predictors: (Constant), AGE_CAT, GENDER, RACE, INTENT, FIN_AID, DROPS, RLY_S_CH, ADDS

[e] Predictors: (Constant), AGE_CAT, GENDER, RACE, INTENT, FIN_AID, DROPS, RLY_S_CH, ADDS, DAYS_RG

As shown in Table 36, the regression model for best predicting semester course completion rate from a combination of student characteristics and enrollment and registration behaviors was Model 5. This model included four of the six enrollment and registration variables: number of course drops, proportion of schedule changes made in the early add-drop period, number of course adds, and when a student initially enrolled. Table 36 also shows that 8.6% of the total variation in students' fall semester course completion could be accounted for by the combination of five student characteristics: age category, gender, ethnicity, academic intent, and financial aid eligibility. Therefore, by controlling for student characteristics, an additional 43.9% of the total variation in students' fall semester course completion could be accounted for by a combination of four enrollment and registration behaviors: the number of course drops, the proportion of course schedule changes made early in the add-drop period, the number of course adds, and the date that the student initially enrolled.

Table 37 provides regression coefficient information on all of the included variables for model 5 of this regression analysis.

Table 37

Multiple Regression Analysis With Fall Semester Course Completion as the Outcome Variable With Student Characteristics Held Constant (n = 932)

Variable	B	SE B	ß	t
(Constant)	0.440	.039		11.224***
AGE_CAT	0.027	.026	-.025	-1.026
GENDER	0.007	.018	-.010	-0.402

(table continues)

Table 37 (continued)

Variable	B	SE B	ß	t
RACE	0.149	.028	.123	5.253***
INTENT	0.030	.018	.040	1.675
FIN_AID	0.057	.019	-.077	-3.061**
DROPS	-0.120	.006	-.581	-20.928***
RLY_S_CH	0.223	.025	.256	8.935***
ADDS	0.074	.008	.289	9.294***
DAYS_RG	.001	.000	.098	3.996***

**p < .01; ***p < .001.

Based on these results, the researcher was able to reject the sub-hypothesis VIII (b) - Controlling for student characteristics, enrollment and registration behaviors do not predict fall semester course completion. The findings from this portion of the study indicated that a combination of four student enrollment and registration behaviors could account for 43.9% of the total variation in fall semester course completion beyond the 8.6% of variation predicted from student characteristics. For Model 5 of this regression analysis, the student characteristics of ethnicity and financial aid eligibility were significant predictors of fall semester course completion. White students had a .149 higher course completion proportion than Black students and students not eligible for financial aid had a .057 higher course completion proportion than students who were eligible for financial aid. The student characteristics, age category, gender, and academic intent had no statistically significant association with fall semester course completion once the other variables were accounted for.

The logistic regression model used to determine the ability of enrollment and registration behaviors to predict student attrition as measured at the spring semester while holding student characteristics constant was the forward likelihood-ratio (LR) method. Table 38 provides a summary of the estimated coefficients and related statistics from the logistic regression model that resulted in the largest prediction of the odds for student attrition from a constant and the variables: age category, gender, ethnicity, academic intent, financial aid eligibility, number of course drops, when student initially enrolled, and number of course adds. As in the multiple linear regressions conducted earlier, the variables, ethnicity, and proportion of schedule changes made in the early add-drop period limited the sample to $\underline{n} = 932$ since 433 students had a combination of no course schedule changes or were not either a White or Black as defined ethnicity. The logistic regression model was developed by forcing all of the control variables in block 1: age category, gender, ethnicity, academic intent, and financial aid eligibility. The predictor variables were loaded into block 2: when student initially enrolled, total number of schedule changes, number of course drops, number of course adds, number of course section changes, and proportion of schedule changes made in the early add-drop period. The criterion for the forward LR inclusion or exclusion of the predictor variables was based on the significance level of the chi square for the change in –2 log-likelihood increase of < = .050 and the log-likelihood decrease of > = .100.

Table 38

Logistic Regression Analysis With Attrition as the Outcome Variable and Enrollment and Registration Behaviors as Predictors While Holding Student Characteristics Constant (n = 932)

Variable	B	SE B	Wald	df	Exp (B)
(Constant)	1.298	.385	11.357	1	3.661*
AGE_CAT	-0.303	.257	1.388	1	0.738
GENDER	0.110	.193	0.329	1	1.117
RACE	0.042	.281	0.023	1	1.043
INTENT	0.297	.190	2.457	1	1.346
FIN_AID	-0.141	.199	0.505	1	0.868
DROPS	-0.697	.060	137.338	1	0.498***
DAYS_RG	0.013	.002	46.224	1	1.013***
ADDS	0.424	.074	33.132	1	1.528***

*$p < .05$; ***$p < .001$.

Findings shown in Table 38 indicate that for each additional course dropped during the fall semester, the odds of enrolling for the spring semester decreased by 50.2% (.498 is .502 less than 1). Results also indicated that for each additional day earlier initially enrolled for the fall semester, the odds of enrolling for the spring semester increase by 1.3%. Finally, results indicated that for each additional course added during the fall semester, the odds of enrolling for the spring semester increased by 52.8%.

As shown in Table 39, the logistic regression model for best predicting observed student attrition from enrollment and registration behaviors, while holding student characteristics constant was Model 3. This model included all five of the student characteristic variables and three of the six enrollment and registration variables: number of course drops, when a student initially enrolled for the fall semester, and number of course adds.

Table 39

Logistic Regression Model Summary for Attrition by Enrollment and Registration Behaviors While Holding Student Characteristics Constant
(n = 932)

Step	-2 Log Likelihood	Chi-square	df	Sig.
1[a]	865.30	123.342	1	.000
2[b]	802.57	62.733	1	.000
3[c]	764.81	37.762	1	.000

Note. Initial –2 Log Likelihood: 1013.928 (before characteristics were entered into block 1)

Initial –2 Log Likelihood: 988.643 (while controlling for student characteristics)

[a] Variable entered on step 1: DROPS

[b] Variable entered on step 2: DAYS_RG

[c] Variable entered on step 3: ADDS

Table 40 provides information on the comparison of model predictions with actual observed outcomes as indicated by the results. These findings indicate the model's ability to predict those students who do enroll in the spring semester but the model is considerably weaker in predicting those student who do not enroll in the spring.

Table 40

Classification Table for Logistic Regression Model 3

	Predicted n		Predicted
Observed	Not Enrolled for Spring Semester	Enrolled for Spring Semester	Percentage Correct
Attrition			
Not Enrolled = 218	100	118	45.9%
Enrolled = 714	35	679	95.1%
Overall percentage			83.6%

Based on the results depicted in Tables 38, 39, and 40, the researcher was able to reject the sub-hypothesis VIII (c) - Controlling for student characteristics, enrollment and registration behaviors do not predict attrition. The findings from this portion of the study indicated that a combination of three student enrollment and registration behaviors could best predict the odds of student attrition when holding student characteristics constant. The number of course drops, when a student initially enrolled for the fall semester, and the number of course adds could predict the odds of student attrition. The total number of course schedule changes and number of course section changes had no statistically significant association with student attrition once the other variables were accounted for.

One final logistic regression was conducted to determine the status of fall semester GPA and fall semester course completion as predictors of student attrition when included as part of a comprehensive model that included student characteristics as a constant and enrollment and registration behaviors as predictor variables. Table 41 provides a summary of the estimated coefficients and related statistics from the logistic regression model that best predicts the odds of student attrition from constant variables (age category, gender, ethnicity, academic intent, and financial aid eligibility) and a combination of other variables: fall semester GPA, when student initially enrolled for the fall semester, number of course drops, and fall semester course completion. As in the logistic regression conducted earlier, the variables, ethnicity and proportion of schedule changes made in the early add-drop period limited the sample to $\underline{n} = 932$ since 433 students had a combination of either no schedule changes or were not either a White or Black as defined by ethnicity. The logistic regression model was developed by forcing all of the control variables in block 1: age category, gender, ethnicity, academic intent, and financial aid eligibility. The predictor variables were loaded into block 2: when student initially enrolled, total number of schedule changes, number of course drops, number of course adds, number of course section changes, proportion of schedule changes made in the early add-drop period, fall semester GPA, and fall semester course completion. The criteria for the forward LR inclusion or exclusion of the predictor variables was based on the significance level of the chi square for the change in -2 log-likelihood increase of < = .050 and the log-likelihood decrease of > = .100.

Table 41

Logistic Regression Analysis for Attrition With Enrollment and Registration Behaviors and Academic Outcomes as Predictors While Holding Student Characteristics Constant
(n = 932)

Variable	B	SE B	Wald	df	Exp (B)
(Constant)	-0.688	.444	2.395	1	0.503
AGE_CAT	-0.352	.282	1.554	1	0.703
GENDER	0.198	.204	0.946	1	1.219
RACE	-0.297	.295	1.011	1	0.743
INTENT	0.157	.202	0.605	1	1.170
FIN_AID	0.106	.215	0.244	1	1.112
SEM_GPA	0.378	.099	14.473	1	1.459***
DAYS_RG	0.012	.002	35.150	1	1.012***
DROPS	-0.281	.057	24.247	1	0.755***
CRS_COMP	1.659	.467	12.617	1	5.253***

***$p < .001$.

The findings in Table 41 indicate that for each additional one-point increase in fall semester GPA, the odds of enrolling for the spring semester increase by 45.9%. The findings also indicate that for each additional day earlier that a student initially enrolls for the fall semester, the odds of enrolling for the spring semester increase by 1.2%. For each additional course dropped by the student in the fall semester, the odds of enrolling for the spring semester decrease by 24.5% (.755 is .245 less than 1). Finally, for each additional one-unit increase in fall semester course completion, the odds of enrolling for the spring semester increase by 5.25 times.

As shown in Table 42, the best logistic regression model for predicting attrition from enrollment and registration behaviors and academic outcomes, while holding student characteristics constant was model 4. This model included three of the six enrollment and registration variables: number of course drops, when a student initially enrolled, and number of course adds plus fall semester GPA and fall semester course completion.

Table 42

Logistic Regression Model Summary for Attrition by Enrollment and Registration Behaviors and Academic Outcomes While Holding Student Characteristics Constant
(n = 932)

Step	-2 Log Likelihood	Chi-square	df	Sig.
1[a]	768.07	220.578	1	.000
2[b]	732.31	35.756	1	.000
3[c]	696.07	36.241	1	.000

(table continues)

Table 42 (continued)

Step	-2 Log Likelihood	Chi-square	df	Sig.
3[d]	683.36	12.711	1	.000

Note. Initial –2 Log Likelihood: 1013.928 (before characteristics were entered into block 1)

Initial –2 Log Likelihood: 988.643 (while controlling for student characteristics)

[a]Variable entered on step 1: SEM_GPA

[b]Variable entered on step 2: DAYS_RG

[c]Variable entered on step 3: DROPS

[d]Variable entered on step 4: CRS_COMP

Table 43 provides information on the comparison of model predictions with actual observed outcomes as indicated by the data. These findings indicate the model's ability to predict those students who do enroll in the spring semester but the model is considerably weaker in predicting those student who do not enroll in the spring.

Table 43

Classification Table for Logistic Regression Model 4

Observed	Predicted n Not Enrolled for Spring Semester	 Enrolled for Spring Semester	Predicted Percentage Correct
Attrition			
Not Enrolled = 218	124	94	56.9%
Enrolled = 714	44	670	93.8%
Overall percentage			85.2%

The findings from this analysis indicated that a combination of three student enrollment and registration behaviors, fall semester GPA, and fall semester course completion could best predict the odds for student attrition when holding student characteristics constant.

Chapter Summary

The purpose of this chapter was to present and discuss the data analyses and findings related to answering the five research questions posed for this study. The relationships between student characteristics and enrollment and registration behaviors and academic outcomes were examined. The potential for enrollment and registration behaviors to predict academic outcomes was explored for subgroups of first-time full-time community college students by age, gender, ethnicity, academic intent, and financial aid eligibility.

The sample utilized in the study (n = 1,365) consisted of three cohorts of students who first enrolled in a full-time capacity at one community college in either fall 1994, fall 1995, or fall 1996. All students indicated that they were pursuing a certificate or associate degree that would involve their full-time enrollment for at least two semesters or more. The students were categorized into two age groups: traditional age was less than 25 years old and non-traditional age was 25 years and older. The sample of students was 87.5% traditional age (n = 1,194) and 12.5% non-traditional age (n = 171). The gender makeup of the sample was 56.9% female (n = 777) and 43.1% male (n = 588). The ethnicity groupings were 7.9% Black (n = 108), 81.6% White, and the balance of the sample was comprised of a combination of students who did not indicate their ethnicity and a very small composite of students from other ethnic areas (n = 43). For the analyses that included ethnicity, only Black and White students were included. The students were also categorized according to their academic intent. Occupational students comprised 38.9% (n = 517) of the sample and transfer students comprised 62.1% (n = 848). Finally, used as a proxy for socioeconomic status, students were categorized into subgroups according to their financial aid eligibility. Those students eligible for financial aid comprised 42.3% of the sample (n = 577) and those not eligible comprised 57.7% of the sample (n = 788).

This chapter included analyses of student characteristics as they related to enrollment and registration behaviors. Sub-hypotheses related to main research hypotheses I, III, and IV were rejected based on the statistical findings for the relationships between the five student characteristics studied and the six enrollment and registration behaviors investigated; sub-hypotheses related to the second main hypothesis were not rejected.

Hypothesis V investigated whether there were interrelationships among the enrollment and registration behaviors investigated in this study. Results indicated statistically significant relationships so the hypothesis was rejected. Hypothesis VI investigated the interrelationships among the three academic outcomes variables examined in this study. Results indicated statistically significant relationships so the hypothesis was also rejected.

Main research hypotheses VII and VIII examined whether student enrollment and registration behaviors could predict student academic outcomes with and without holding student characteristics constant. In all cases, the sub-hypotheses were rejected based on the statistical findings.

CHAPTER 5

SUMMARY, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

The problem of student attrition in community colleges has become more important as calls for accountability in the use of public resources intensify (American Association of Community Colleges, 1994; Brawer, 1996; Rahn & Holmes, 1999). Many institutions' primary strategy for reducing attrition is the early identification of students likely to drop out and the development and implementation of intervention services for those students (Dietsche, 1995; Grimes & Antworth, 1996; Upcraft & Gardner, 1989; Webb, 1989). Despite these efforts to reduce attrition, however, it largely remains an unsolved problem for community colleges (Astin, Korn & Green, 1987; Jones, 1986; Noel & Levitz, 1985). A more in-depth understanding of the process and those participating in it are necessary to develop initiatives that can further reduce student attrition (Conklin, 1997; Dietsche, 1995; Opp & Colby, 1986).

Researchers have typically investigated community college student attrition by focusing on student characteristics and academic variables (Aquino, 1990; Brawer, 1996 Grimes & Antworth, 1996; Pascarella & Terenzini, 1980; Tharp, 1998). However, many of these studies have resulted in mixed findings so more research is needed to better understand the influences and predictors of student attrition and subsequently the strategies that may affect its reduction (Aquino, 1990; Brawer, 1996; Jones, 1986). The investigation of community college student enrollment and registration behaviors may provide valuable additional data for understanding and identifying students likely to dropout. The results of this research, when applied as part of a comprehensive system of identification, intervention, and implementation has the potential for reducing the attrition of community college students (Grimes & Antworth, 1996; Jones, 1982).

Previous research on community college student enrollment and registration behaviors is very limited and has either focused on students as late registrants or on course schedule changes (adds and drops) made by students (Angelo, 1990; Peterson, 1986; Sova, 1986; Stein, 1984). The present study introduces the investigation of several additional enrollment and registration behaviors that have not been studied in relation to student attrition by any other researchers. Specifically, the enrollment and registration behaviors examined in this study were: (a) when students initially enroll for classes, (b) how many changes they make to their course schedule, (c) the kinds of changes they make to their course schedule, and (d) when those changes are made.

The purpose of this study was to investigate the relationships between community college student characteristics, student enrollment and registration behaviors, and academic outcomes. The research included the examination of whether there were interrelationships among the enrollment and registration behaviors studied and interrelationships among the academic outcomes studied. Finally, the study also investigated if enrollment and registration behaviors could predict student academic outcomes.

Research Questions

Five research questions provided the direction for this study:

(1) What are the relationships between student characteristics and enrollment and registration behaviors?

(2) What are the interrelationships among enrollment and registration behaviors?

(3) What are the interrelationships among student academic outcomes?

(4) Do student enrollment and registration behaviors predict student academic outcomes?

(5) Controlling for student characteristics do, enrollment and registration behaviors predict student academic outcomes?

This study was based on an ex post facto research design that involved the investigation of a sample of students during one period of their enrollment at a small rural community college. The sample ($\underline{n}$ = 1,365) for this study was comprised of 473 students who first enrolled in the fall semester of 1994, 461 students who first enrolled in the fall semester of 1995, and 431 students who first enrolled in the fall semester of 1996.

The five student characteristic variables investigated in this study were student age, gender, ethnicity, academic intent, and financial aid eligibility. The enrollment and registration (predictor) variables examined in this study were: (a) when students initially enrolled for the fall academic semester, (b) how many changes students made to their course schedule, (c) how many of the course schedule changes were drops, (d) how many of the course schedule changes were adds, (e) how many of the course schedule changes were section changes, and (f) when were changes were made to their course schedule. The three outcomes variables explored in this study were: fall semester grade point average, fall semester course completion, and attrition (whether the student enrolled for the spring semester).

Using a maximum alpha level of .05, the research hypotheses were examined using independent samples $\underline{t}$-tests, Spearman rank-order correlation coefficients, multiple linear regression, and logistic regression. For each regression analysis involving the student characteristics as control variables, they were forced into block 1 so that their collective influence could be determined when the predictor variables were entered stepwise into block 2 of the analysis. For the logistic regression analyses involving the student characteristics as control variables, they were included in the regression by utilizing the enter method for block 1; the enrollment and registration behaviors were entered into the analyses utilizing the forward likelihood-ratio (LR) method.

Summary of Findings

The specific details of the findings from this study are reported in Chapter 4. The following sections provide a narrative summary of those findings.

Relationships Between Student Characteristics and Enrollment and Registration Behaviors

Research question 1 asked if there was any relationship between student characteristics and enrollment and registration behaviors. In this study, student age, gender, ethnicity, academic intent, and financial aid eligibility were the characteristics investigated. These five student characteristics were examined in relation to six enrollment and registration behaviors.

The first main research hypothesis and related sub-hypotheses examined the differences in the number of days in relation to the start of the fall semester that a student initially enrolled as it related to the five pairs of subgroups of students based on their characteristics. This variable was found to have a statistically significant relationship ($p < .01$) with all five student characteristics investigated in this study. Students who were traditional-age (less than 25 years old), on average, initially enrolled for fall semester classes earlier than nontraditional-age students ($M = 96.99$ days compared to $M = 64.27$ days). Female students, on average, initially enrolled for fall semester classes earlier than male students ($\underline{M} = 96.40$ days compared to $\underline{M} = 88.27$ days). White students, on average, initially enrolled for fall semester earlier than Black students ($\underline{M} = 92.30$ days compared to $\underline{M} = 63.95$ days). Students who were transfer majors, on average, initially enrolled for the fall semester earlier than students who were occupational majors ($\underline{M} = 97.00$ days compared to $\underline{M} = 86.17$). Finally, students not eligible for financial aid, on average, initially enrolled for the fall semester earlier than students who were eligible for aid ($\underline{M} = 101.25$ days compared to $\underline{M} = 81.48$ days).

The second main research hypothesis and related sub-hypotheses examined the number of changes students made to their fall course schedule. This variable was found not to have any statistically significant relationship ($\underline{p} < .05$) with any of the five student characteristics studied.

The third main research hypothesis and related sub-hypotheses investigated the kinds of changes students made to their fall course schedule. These changes could be in the form of course drops, course adds, or course section changes. Each of these three kinds of changes was analyzed separately for the five student characteristics studied. Only three statistically significant relationships ($\underline{p} < .05$) were found: Black students, on average, were found to have a statistically significant greater number of course drops than White students ($\underline{M} = 2.07$ course drops compared to $\underline{M} = 1.50$ course drops); students with an occupational major, on average, had a statistically significant greater number of course adds than students with a transfer major ($\underline{M} = .93$ course adds compared to $\underline{M} = .78$ course adds); and finally, female students, on average, were found to have a statistically significant greater number of course section changes than male students ($\underline{M} = .36$ course section changes as compared to $\underline{M} = .26$ course section changes). The other 12 relationships investigated between the kinds of courses schedule changes and student characteristics were found not to be statistically significant.

The fourth main research hypothesis and related sub-hypotheses investigated the proportion of course changes made in the early add-drop period. Female students, on average, were found to make a statistically significant larger proportion of their course schedule changes in the early add-drop period than male students (M = .532 compared to M = .435). White students, on average, were found to make a statistically significant larger proportion of their course schedule changes in the early add-drop period than Black students (M = .506 compared to M = .362). Finally, students who were not eligible for financial aid, on average, were found to make a statistically significant larger proportion of their course schedule changes in the early add-drop period than students who were eligible for financial aid (M = .539 compared to M = .426).

Findings related to the sub-hypotheses linked to main hypotheses I, II, III, and IV are not directly comparable to findings in any other research studies since a review of the literature did not identify any other research that examined these same types of enrollment and registration behaviors. Of the six behaviors investigated, when students initially enrolled for the fall semester and when student made changes to their course schedule had the largest and most frequent relationships with the student characteristics studied. The other enrollment and registration behaviors, total number of schedule changes, number of course drops, number of course adds, and number of course section changes did not have strong or many relationships with the student characteristics studied.

Interrelationships Among Enrollment and Registration Behaviors

Research question 2 asked if there were any interrelationships among the enrollment and registration behaviors. Hypothesis V investigated the interrelationships among the six enrollment and registration behaviors using correlation coefficients that accounted for unequal variances. Acknowledging a non-normal distribution of the data, a total of 15 Spearman rank-order correlation coefficients were examined to determine the interrelationships among the enrollment and registration behaviors investigated in this study. Twelve of these coefficients resulted in a statistically significant correlation. These coefficients, for the purposes of explanation, were categorized into three areas: strong correlation ($r_s > .699$), moderate correlation ($.300 <= r_s < .700$), and weak correlation ($r_s < .3$).

Two Spearman rank-order correlations were strong. One investigated the relationship between total number of schedule changes and number of course drops ($r_s = .876$, $p < .01$) and the other investigated the relationship between total number of schedule changes and number of course adds ($r_s = .702$, $p < .01$). These results were expected since total number of schedule changes was a variable that was actually comprised of the sum of the variables, number of course drops, number of course adds, and number of course section changes.

Four Spearman rank-order correlations were moderate. One of these investigated the relationship between total number of schedule changes and number of section changes ($r_s = .406$, $p < .01$). This relationship was expected since, as mentioned earlier, number of section changes actually comprised part of the value for total number of schedule changes. Other correlations between number of course drops and number of course adds ($r_s = .430$, $p < .01$) and number of section changes and proportion of schedule changes made in the early add-drop period ($r_s = .303$,

$p < .01$) were moderate in size. The relationship between course adds and drops suggests that moderate numbers of students who drop courses also add courses; conversely it also suggests moderate numbers of students that only engage in one of these kinds of schedule changes. A stronger relationship between section changes and proportion of course schedule changes made in the early add-drop period was expected than what was found. Since section changes after the first week of the semester require authorization from a faculty member and an available seat in the course, it was expected that more of these kinds of schedule changes would be related to making a higher proportion of schedule changes early in the add-drop period. However, a moderate correlation can be reasonably expected given the small number of course section changes made as compared to course drops. The last moderate correlation between number of course adds and proportion of schedule changes made in the early add-drop period is also expected for similar reasons ($r_s = .532$, $p < .01$). Students who want to add courses one week after the start of the semester must obtain authorization from the faculty member teaching the course. This is generally more difficult to achieve based on the available seats in the class and the amount of course material already covered in the first week. It is reasonable to expect a significant correlation suggesting that course adds are related to higher proportions of schedule changes made in the early add-drop period.

Six Spearman rank-order correlations were weak but significant. The correlation of when a student initially enrolled and number of course adds ($r_s = .088$, $p < .01$), when a student initially enrolled and proportion of schedule changes made in the early add-drop period ($r_s = .225$, $p < .01$), total number of schedule changes and proportion of schedule changes made in the early add-drop period ($r_s = .221$, $p < .01$), number of course drops and number of section changes ($r_s =$

.130, $p < .01$), number of course drops and proportion of schedule changes made in the early add-drop period ($r_s = -.171.$, $p < .01$), and number of course adds and number of section changes ($r_s = .210$, $p < .01$) all suggest that the variables had weak relationships.

Overall, the high number of statistically significant findings allowed the researcher to reject Hypothesis V – There is no interrelationship among the enrollment and registration behaviors investigated in this study. The review of the literature revealed no previous studies that examined interrelationships among various enrollment and registration behaviors. Therefore, a comparison of these findings with other studies was not possible.

Interrelationships Among Student Academic Outcomes

Research question 3 asked if there were any interrelationships among the student academic outcomes investigated in the study. The sixth main research hypothesis and related sub-hypotheses investigated the interrelationships among fall semester grade point average, fall semester course completion, and attrition (as measured by enrollment in the spring semester). A Spearman rank-order correlation coefficient was utilized to investigate the relationship between fall semester GPA and fall semester course completion and results indicated a strong correlation ($r_s = .544$, $p = .000$). This finding suggests that higher student fall semester GPAs are related to higher proportions of courses completed for the semester; conversely, it also suggests that lower student fall semester GPAs are related to lower proportions of courses completed for the semester. This finding is consistent with a study conducted by Bers (1997), who also found a significant relationship between semester GPA and course completion ($R^2 = .657$, $p < .05$).

The relationships between fall semester GPA and attrition and fall semester course completion and attrition were both tested by independent samples t-tests. Fall semester GPA was found to be significantly related to attrition, with students who did not enroll in the spring semester on average earning a GPA of 1.71 as compared to students who did enroll for the spring semester earning a mean GPA of 3.50.

An alternative test was also conducted by removing from the student sample 137 students who earned a 0.00 GPA for the fall semester. This level of GPA indicated that those students had dropped all of their courses prior to the end of the semester. Rationale for this alternative analysis lies in the interpretation of GPA as a measure of academic performance and dropping all courses could be considered as no academic performance at all. Further, since the institution studied had a 5.00 grade point average scale, 1.00 was equated with flunking a class. The independent samples t-test for this alternative analysis still indicated a significant relationship between GPA and attrition with students who did not enroll in the spring semester on average earning a GPA of 2.54 as compared to students who did enroll for the spring semester earning a mean GPA of 3.66.

The relationship between fall semester course completion and attrition was also found to be significant, with students who did not enroll in the spring semester completing an average of only 25.3% of their credit hours enrolled in as compared to students who did enroll for the spring semester completing an average of 70.6% of their credit hours.

These results allowed the researcher to reject the three sub-hypotheses related to the sixth main research hypothesis: VI (a) There is no relationship between fall semester grade point average and fall semester course completion, VI (b) There is no relationship between fall semester grade point average and attrition, and VI (c) There is no relationship between fall semester course completion and attrition.

The findings on the relationship between GPA and attrition were consistent with the findings of several other research studies of community college students (Brooks-Leonard, 1991; Mohammadi, 1994; Windham, 1994). Brooks-Leonard (1991) found that first-term GPA was significantly related to retention ($N = 706$, $p < .01$). Her investigation of community college students found that the average GPA for a full-time student retained for the following semester was 3.06 (4.00 scale) while the GPA for a full-time student who dropped out was 1.49. Mohammadi (1994) investigated first-time community college students and found that overall GPA and semester GPA were both significant predictors of retention and student GPA was associated with attrition. Windham (1994) found in her investigation of first-time community college students that GPA was a variable that was statistically significant ($\underline{p} < .01$) for the four measures of attrition investigated in her study.

The findings on the relationship between course completion and attrition were consistent with research conducted by Bers (1997) and Mohammadi (1994). Bers (1997) study of community college students in an affluent suburban area found that the percentage of fall courses passed was significantly correlated with the number of terms that the student persisted at the college up through three consecutive terms ($\underline{r} = .428$, $\underline{p} < .05$). Mohammadi (1994) found that attrition was higher for those students with significantly lower credit hours completed when compared to those students who were still enrolled after one year.

Student Enrollment and Registration Behaviors as a Predictor of Student Academic Outcomes

Research question 4 asked if enrollment and registration behaviors could predict student academic outcomes. The seventh main research hypothesis and related sub-hypotheses examined whether the enrollment and registration behaviors investigated in this study could predict fall semester GPA, fall semester course completion, and attrition. Multiple linear regression analyses were utilized to determine if enrollment and registration behaviors could predict fall semester GPA and fall semester course completion. Logistic regression analysis was utilized to determine if enrollment and registration behaviors could predict the odds related to attrition since it was a dichotomous categorical variable. A statistically significant association was found between enrollment and registration behaviors and all three academic outcomes.

The first multiple regression analysis of enrollment and registration behaviors as predictor variables for fall semester GPA resulted in a model that could explain 37.6% of the variance in fall semester GPA from a combination of four enrollment and registration behaviors ($\underline{F}$ = 157.712; df = 4, 1048, $\underline{p}$ = .000). A stepwise regression method was utilized with all the predictor variables entered in block 1. Statistically significant contributions were found with number of course drops, number of course adds, proportion of schedule changes made in the early add-drop period, and when a student initially enrolled included in the regression model. The regression model indicated that for each one-course increase in number of course drops, fall semester GPA would be decreased by .496; for each one-course increase in number of course adds, fall semester GPA would be increased by .382; making all as opposed to none of one's schedule changes in the early add-drop period was related to fall semester GPA being increased by .447; and for each one-day increase in when a student initially enrolled, fall semester GPA would be increased by .003.

The second multiple regression analysis of enrollment and registration behaviors as predictor variables for fall semester course completion resulted in a model that could explain

48.6% of the variance in fall semester course completion from a combination of four enrollment and registration behaviors (F = 248.066; df = 4, 1048, p = .000). A stepwise regression method was utilized with all the predictor variables entered in block 1. Statistically significant contributions were found with proportion of schedule changes made in the early add-drop period, number of course drops, number of course adds, and when a student initially enrolled included in the regression model. The regression model indicated that when all course changes were made in the early add-drop period, fall semester course completion would be increased by .228; for each one-course increase in number of course drops, fall semester course completion would be decreased by .122; for each one-course increase in number of course adds, fall semester course completion would be increased by .077; and for each one-day increase in when a student initially enrolled, fall semester course completion would be increased by 001.

Prior to conducting the logistic regression analysis to determine the ability of enrollment and registration behaviors to predict attrition, the relationship of those behaviors with attrition was investigated. Independent samples t-tests were conducted on the enrollment and registration behaviors for students who did enroll for spring semester courses and for students who did not enroll for spring semester courses. Results for this study indicated that students who did not enroll for the spring semester immediately following the fall semester on average initially enrolled for fall semester classes approximately 70 days prior to the start of the semester, made four changes to their course schedule, dropped three courses, and made nearly 32% of their schedule changes early in the add-drop period. Conversely, students who did enroll for the spring semester on average initially enrolled for the fall semester approximately 99 days prior to the start of the semester, made less than three changes to their course schedule, dropped less than two courses, and made nearly 55% of their schedule changes in the early add-drop period.

The logistic regression analysis of enrollment and registration behaviors as predictors of the odds for attrition resulted in a model that could predict the odds with a combination of three variables. This model included the enrollment and registration variables: number of course drops, when a student initially enrolled, and number of course adds. The regression model indicated that for each additional course drop a student made during the fall semester, the odds of enrolling for the spring semester decreased by 50.7%, for each additional course add, the odds of enrolling for the spring semester increased by 60.3%, and for each additional day earlier that a student initially enrolled for the fall semester, the odds of enrolling for the spring semester increased by 1.2%.

Some of these findings were consistent with research conducted at Clemson University by Fleming, Hill and Merlin (1985). Their study, profiling students with high incidence of course drops over several semesters, found that twice as many of these students earned a GPA in the 1.60 to 2.40 range (4.00 scale) than regular students. This compares partially with the present study, which found that as the number of course drops increased, semester GPA decreased. While the differences between the two studies are substantial, their findings still suggest a similar relationship between the variables, course drops and grade point average.

Student Enrollment and Registration Behaviors as a Predictor of Student Academic Outcomes While Holding Student Characteristics Constant

Research question 5 asked if, while controlling for student characteristics, enrollment and registration behaviors could predict student academic outcomes. The eighth main research hypothesis and related sub-hypotheses examined whether enrollment and registration behaviors investigated in this study could predict fall semester GPA, fall semester course completion and attrition, while holding student characteristics constant. Multiple linear regression analyses were utilized to determine if enrollment and registration behaviors could predict fall semester GPA and fall semester course completion beyond that predicted by student characteristics. Logistic regression analysis was utilized to determine if enrollment and registration behaviors could predict the odds of attrition beyond that predicted by student characteristics since it was a dichotomous categorical variable. A statistically significant association was found between enrollment and registration behaviors and all three academic outcomes beyond what could be accounted for by a combination of student characteristics.

The multiple regression analysis of enrollment and registration behaviors as predictor variables for fall semester GPA, while holding student characteristics constant, resulted in a model that could explain 33.9% of the variance in fall semester GPA beyond the 6.5% explained by a combination of five student characteristics variables. This regression model indicated that a combination of student characteristics and four enrollment and registration behaviors ($\underline{F}$ = 69.442; df = 9, 922, $\underline{p}$ = .000) resulted in a statistically significant regression model. The four enrollment and registration behaviors in this model were (a) number of course drops, (b) number of course adds, (c) proportion of schedule changes made in the early add-drop period, and (d) when a student initially enrolled. For this model, all of the student characteristic variables (control) were forced into block 1 of this regression analysis. The enrollment and registration behaviors (predictors) were entered stepwise in block 2. The regression model indicated that being a traditional-age student was related to a .260 higher fall semester GPA than a nontraditional-age student, being White was related to a .379 higher fall semester GPA than being Black, and being eligible for financial aid was related to a .220 lower fall semester GPA than not being eligible for financial aid. In addition, each one-course increase in DROPS was related to a .478 lower fall semester GPA, each one-course increase in ADDS was related to .366 higher fall semester GPA, making all as opposed to none of one's schedule changes in the early add-drop period was related to .430 higher fall semester GPA, and each one-day increase in when a student initially enrolled was related to .002 higher fall semester GPA.

The multiple regression analysis of enrollment and registration behaviors as predictors for fall semester course completion resulted in a model that could explain 43.9% of the variance in fall semester course completion from a combination of four enrollment and registration behaviors beyond the 8.6% of variation accounted for by a combination of student characteristics. This regression model indicated that a combination of student characteristics and four enrollment and registration behaviors ($\underline{F}$ = 113.093; df = 9, 922, $\underline{p}$ = .000) resulted in a statistically significant regression model. The enrollment and registration behaviors included in this model were (a) number of course drops, (b) proportion of schedule changes made in the early add-drop period, (c) number of course adds, and (d) when a student initially enrolled. For this model, all of the student characteristic variables (control) were forced into block 1 of this regression analysis. The enrollment and registration behaviors (predictors) were entered stepwise in block 2. The regression model indicated that being White was related to a .149 higher fall semester course completion than being Black and being eligible for financial aid was related to a .057 higher fall semester course completion than not being eligible for financial aid. In addition, each one-course increase in course drops was related to .120 lower fall semester course completion, making all as opposed to none of one's schedule changes in the early add-drop period was related to a .223 higher fall semester course completion, each one-course increase in course adds was related to a .074 higher fall semester course completion, and each one-day increase in when a student initially enrolled was related to a .001 higher fall semester course completion.

The logistic regression analysis of enrollment and registration behaviors as predictors of the odds of attrition in combination with student characteristics could best predict the odds of attrition with three of the six enrollment and registration variables. The number of course drops, when a student initially enrolled, and number of course adds in combination could best predict the odds of student attrition. The regression model indicated that for each additional course drop a student made during the fall semester, the odds of enrolling for the spring semester decreased by 50.2%, for each additional day earlier that a student initially enrolled for the fall semester, the odds of enrolling for the spring semester increased by 1.3%, and for each additional course add, the odds of enrolling for the spring semester increased by 52.8%. With the predictor variables in this model, none of the student characteristic variables (control) were statistically significant in the regression model.

One final logistic regression analysis was conducted that included fall semester GPA and fall semester course completion as predictor variables along with enrollment and registration behaviors to predict attrition. This model held student characteristics constant to determine if any combination of these eight predictor variables could predict student attrition as measured at the spring semester. This analysis resulted in a model that included two of the six enrollment and registration variables: when a student initially enrolled and number of course drops along with GPA and fall semester course completion. The regression model indicated that for each one-point increase in fall semester GPA, the odds of enrolling for the spring semester increased by 1.459 times. For each additional day earlier that a student initially enrolled, the odds of enrolling for the spring semester increased by .012 times. For each additional course drop a student made during the fall semester, the odds of enrolling for the spring semester decreased by 24.5%, and for each one-unit increase in fall semester course completion, the odds of enrolling for the spring semester increased by 5.25 times. With the predictor variables in this model, none of the student characteristic variables (control) were statistically significant in the regression model.

Conclusions and Implications

This study was conducted using a conceptual framework based on a portion of the Bean and Metzner (1985) model of nontraditional student attrition. Bean and Metzner's model includes several categories of variables that interact to influence the attrition decision for nontraditional aged students. A new conceptual framework introduced for this study was essentially validated by many of the findings in this study. This framework proposed a series of relationships between student characteristics and enrollment and registration behaviors and academic outcomes. A considerable number of relationships and associations among the variables investigated in this study were consistent with the proposed new conceptual framework. While many elements of the original Bean and Metzner model were excluded in this new framework, future researchers might consider including additional variables from the Bean and Metzner model to further validate this new conceptual framework as another source that may add to our understanding of the attrition process in full-time community college students.

Conclusions for Research Question 1

In this study, several significant relationships found between student characteristics and enrollment and registration behaviors were expected. For example, this researcher reasoned that traditional-age students, on average, enrolled earlier than nontraditional-age students because college officials aggressively recruited them at local high schools. Further investigation might also explain that transfer students enrolled earlier because 94% of them in this study were of traditional-age. Finally, interviews with the students would likely find that those not eligible for financial aid enrolled earlier because they typically did not wait to determine their ability to pay for college prior to enrollment. The financial aid application process, while it is not meant to delay initial registration, likely dissuades many students from building a course schedule prior to receiving their eligibility notification. In addition, 94.5% of students not eligible for financial aid were of traditional-age, tending to enroll earlier than nontraditional-age students.

Differences in the number of course schedule changes between the subgroups of students by characteristics were not expected except for a possible difference between traditional-age and nontraditional-age students. It was expected that traditional-age students, due to their relative immaturity, would have more schedule changes than nontraditional-age students. However, the findings of this study did not indicate any statistically significant differences in the number of schedule changes between any of the five pairs of student subgroups investigated.

The types of changes students made to their course schedule had very few significant relationships with student characteristics. For the few significant relationships identified, however, several explanations would be likely if investigated further. For example, it might be explained that Black students drop more courses than White students because they did not feel integrated into the mostly White collegiate environment at the institution where this study was conducted. Or, to the extent that dropping a class is associated with poor academic performance in the class, it might also be explained that Blacks were improperly placed into classes or they did not have access to or take advantage of internal and external academic support services available to all students. Another explanation might be that Black students, when compared to White students, had more work scheduling issues or child care issues that caused them to drop classes for non-academic reasons. Clearly, several reasons might explain the reason for this significant difference in course drop behavior but further research is required to explain these behaviors.

In terms of the one significant finding related to student characteristics and course adds, this association was expected. This researcher reasoned that occupational students added more courses than transfer students because faculty in the occupational areas taught clusters of related courses and gave students regular feedback on other courses they should be enrolled in. This regular advising role that occupational faculty assumed was arguably different than, for example, a Rhetoric teacher suggesting a Psychology or a U.S. History course. This researcher's experiences working in community colleges for nearly twenty years has led to expectations of stronger linkages between the occupational faculty and local employers leading to more direct advice being given to students by occupational faculty about what skills and abilities are needed in the workforce. To the extent that occupational students were pursuing education for the purpose of entry into the workforce, it was likely that they would follow faculty advice on course additions. At the institution where this study was conducted, students in transfer programs were advised exclusively by college counselors rather than faculty. The infrequent contact that students had with counselors tended to mitigate the opportunities that counselors had for making recommendations and suggestions about the courses that students should add to their schedule.

In conclusion, in terms of the relationship between these two sets of variables as suggested by the conceptual framework introduced for this study, there were enough statistically significant relationships to support this new framework. The 11 statistically significant relationships identified between student characteristics and enrollment and registration behaviors supported an anticipated association between these elements defined in the conceptual framework. Of a possible 30 separate relationships between the five student characteristics and the six enrollment and registration behaviors, these 11 comprised more than one-third of the total number of possible relationships. It was determined by this researcher that this was significant enough to partially validate that portion of the proposed conceptual framework.

Conclusions for Research Question 2

Many of the interrelationships found among the enrollment and registration behaviors were expected because of the inherent associations among the variables defined for this study. For example, the total number of course changes is comprised of the number of adds, drops, and section changes that students made to their course schedule so naturally there would be relationships among these four variables. However, some relationships were expected but were not found. For instance, the researcher expected to find a relationship between when students initially enrolled and the number of changes made to their course schedule. It was expected that students initially enrolling 2- 5 months prior to the start of the academic semester likely made more changes to their course schedule than student enrolling closer to the start of the semester. If for no other reason, these additional changes would be due to the extended period of time available to them to make changes. This was not the case. Nor was there any relationship noted between when a student initially enrolled and the number of course drops or the number of section changes. These findings can be viewed as partially dispelling the myth that students who enroll in April and May for the fall semester are more likely to change their schedule than those students enrolling in July and August. This lack of a finding, however, could also be due to the focus on only first-time full-time students in this study. Perhaps much different relationships would be found if part-time or returning students were studied. Again, as in the discussion on research question one, more research is needed to understand the reasons students had for their specific enrollment and registration behaviors.

There were, however, modest relationships found between when students initially enrolled and the number of courses added and when course changes were made. There were also modest relationships found between the number of course drops, adds, and section changes suggesting the lack of any significant pattern of type of schedule changes. Collectively, these findings did not suggest any substantive pattern of enrollment and registration behaviors likely to be of particular interest or importance to community college researchers or practitioners.

Collectively, the implications for these relationships between student characteristics and enrollment and registration behaviors lie in the expectations that an institution may have related to student matriculation patterns. In other words, college staff whose responsibility it is to monitor and report enrollment data may become more proficient at projecting enrollment numbers based on who is likely to enroll at specific points in the registration period. Moreover, the amount of course schedule changes and when they are likely to occur can be utilized as information that guides staffing decisions in registration and counseling offices.

These findings do suggest that researchers examining any of these individual enrollment and registration behaviors should be aware of the possible association with other related behaviors. For example, Angelo (1990), Bryant et al. (1996), and Diekhoff (1992), who investigated late registrants, might have found value in some of the findings in the present study. For instance, when students enrolled and when they changed their course schedule were significantly related to the number of course drops and adds. This relationship might help explain the difference in student GPA when comparing late registrants with regular registrants investigated in their studies. It might be found that late registrants in these other studies dropped more classes than regular registrants, and therefore earned relatively higher GPAs than expected because their GPA was based on completing significantly fewer classes than regular registrants.

Conclusions for Research Question 3

Consistent with the literature on academic achievement, this study found significant relationships between the student academic outcomes investigated (Bers, 1997; Panteges & Creedon, 1978; Tinto, 1975). It was expected that there would be significant relationships between GPA, course completion, and attrition. Common sense and basic student development theory led this researcher to anticipate that students with high GPAs would complete more credit hours in the semester than students with low GPAs. In addition, students with higher GPAs would be more likely to enroll in the following semester when compared to students with lower GPAs. Indeed, for this study, the correlation between fall semester GPA and fall semester course completion was fairly strong even when students who earned no GPA by dropping all of their courses were removed from the analysis. Further, there was a significant difference in fall semester GPA when comparing those students who did enroll for the spring semester with students who did not. And finally, there was a significant difference in fall semester course completion when comparing those students who did enroll for the spring semester with students that did not. Since the students in this study were all pursuing a certificate or degree program, attrition was less likely to be due to a student completing his or her educational goal of a few individual courses requiring only one semester of study.

Conclusions for Research Question 4

Based on the experiences of this researcher working as a practitioner in community colleges, it was expected that certain enrollment and registration behaviors would predict student academic outcomes. Findings from this study indicated that a combination of four enrollment and registration behaviors could predict more than one-third of the variation in fall semester GPA for the sample of students investigated. By including students in the sample who dropped all of their courses for their first fall semester, it was not unexpected that for each course dropped, the student's GPA was reduced by nearly one-half of a point. However, when the same analysis was conducted excluding the students who dropped all of their courses, there was still a significant relationship between course drops and semester GPA; albeit the association was approximately half as strong. This finding could be interpreted as being inconsistent with the belief that many community college students drop courses to avoid lowering their GPA (Miller, 1997; Sova, 1986). Conversely, the finding in this study suggests that an opposite condition is occurring; that is, students who drop more classes are earning lower GPAs but still choosing to remain enrolled in some courses.

The number of course additions to the schedule was a significant contributor to predicting variation in GPA with and without the students who dropped all their classes, indicating that students who added courses tended to increase their GPA. It is expected that further investigation might find that adding courses was an overt indicator of student confidence and commitment to education and therefore was associated with earning a higher GPA. Another explanation might be that a more incremental and methodical course selection process for some students led to a greater commitment resulting in a higher semester GPA.

Both analysis that included the students who dropped all their classes and the analysis that excluded them found that when students made changes to their course schedule was a significant predictor of variation in GPA. The significance of this component was nearly the same for both models, indicating that making all of one's schedule changes in the early add-drop period increased GPA by nearly one-half point. This is consistent with the expectation that students who are not still making changes to their course schedule after the semester begins benefit from concentrating on the academic material in their courses. Students who are still making changes in their schedule well after the semester begins are more likely to fall behind academically and earn lower GPAs. This is consistent with Sova's (1986) research conducted on late registrants that found them at greater risk of dropping out or failing than regular registrants.

The final enrollment and registration behavior that could predict variation in GPA was when students initially enrolled. Findings in this study suggested that students enrolling earlier for courses earned slightly higher GPAs than those who enrolled later. While this difference was modest, it was still statistically significant and suggested some benefit associated with early initial enrollment. Further investigation might explain that students who enrolled earlier had a clearer idea of what their educational goals were and demonstrated a higher level of commitment to reaching those goals as evidenced by GPA.

In terms of predicting semester course completion, a combination of the same four enrollment and registration behaviors that predicted variation in semester GPA predicted nearly one-half of the total variation in fall semester course completion for the students in this study. This much higher predictive strength was somewhat expected. First, it was expected that the number of course drops would be a coefficient in this regression model since they are directly related to the course completion rate. The proportion of schedule changes made in the early add-drop period was the variable that could predict the largest variation in course completion. This suggested that students still making schedule adjustments later in the semester (likely to be course drops) would predictably complete less of their courses for the semester. The other variables that could predict variation in course completion, number of course adds and when a student initially registered, suggested more commitment and academic dedication from students as evidenced in their higher proportion of course completion.

In terms of predicting the odds of enrolling in the spring semester based upon enrollment and registration behaviors in the fall semester, several variables could be utilized to predict the odds of attrition. Findings from this analysis indicated that (a) students with larger numbers of course drops reduced their odds of enrolling for the spring semester (b) students with larger numbers of course adds increased their odds of enrolling in the spring semester, and (c) students enrolling earlier increased their odds of enrolling in the spring semester. These behaviors each suggested levels of commitment, confidence, and focus, reflected in students' attrition or persistence in the following semester.

These findings related to research question 5 support the conceptual framework introduced in this study. The relationship between enrollment and registration behaviors and academic outcomes were found to be statistically significant for all three relationships tested. This validated the predicted relationship between these two elements in the new framework.

Conclusions for Research Question 5

Based on previous studies that examined the association of various student characteristics with academic outcomes, a small amount of association was expected (Astin, 1993; Pascarella & Terenzini, 1991; Tinto, 1993). This study found that 6.5% of the variation in fall semester GPA could be predicted by four of the five student characteristics investigated in this study. An additional one-third of the variation in GPA above what the student characteristics could predict, however, could be predicted by a combination of four enrollment and registration behaviors. An analysis of fall semester GPA without including the students who did not earn a GPA since they dropped all of their courses, resulted in a parallel finding. However, this regression model found that 10.3% of GPA could be predicted by a combination of all five student characteristics studied. This was somewhat unexpected since other researchers typically found smaller amounts of variation in GPA being predicted by student characteristics (Gates & Creamer, 1984). An explanation could be that the present study only investigated first-time full-time students. Perhaps the inclusion of second year students, part-time students, or returning students would result in significantly different findings. The additional 13.4 % of variation above what the student characteristics predict could be predicted by a combination of three enrollment and registration behaviors. This was consistent with other analyses in this study.

This study also found that 8.6% of the variation in fall semester course completion could be predicted by two of the five student characteristics investigated in this study. Student ethnicity and financial aid eligibility were found to be statistically significant coefficients for this model.

This was not unexpected since these characteristics were found to be related to several of the enrollment and registration behaviors investigated. An additional 43.9% of variation above what the student characteristics could predict, however, could be predicted by a combination of four enrollment and registration behaviors. This expected association was consistent with other analyses in this study.

Finally, a combination of three enrollment and registration behaviors could best predict the odds of attrition above what could be predicted by student characteristics. When the five student characteristics were included in this regression model, none of them were statistically significant and only number of courses dropped, when a student enrolled, and number of courses added were included in the model. This model resulted in predicting the odds of attrition at nearly the same level as without the inclusion of the student characteristics.

Overall, this study provides empirical evidence that enrollment and registration behaviors can predict a significant amount of the variation in student academic outcomes. This tends to validate the importance of enrollment and registration behaviors as a significant set of variables that should be recorded, analyzed, and included in specific decision-making processes at community colleges. For example, these behaviors should be viewed as part of an at-risk student identification system. Students exhibiting enrollment and registration behaviors that are associated with lower GPA, lower course completion, or higher attrition should be targeted for early intervention services designed to improve student academic success.

Enrollment and registration behaviors should also help guide institutional decisions on matriculation-related policies and procedures. Institutional decisions should be made so that student success is supported by those decisions and not unduly constrained. For example, procedures on what types of changes that students can make to their course schedule and when those changes are authorized could take into account the association between these types of behaviors and academic outcomes. Community colleges would be better serving their students if these enrollment-related procedures encourage behaviors associated with higher academic outcomes.

Recommendations for Educational Policy and Practice

This study investigated the relationships between student characteristics, enrollment and registration behaviors, and academic outcomes at one rural public community college located East-Central Illinois. The sample was comprised of all first-time full-time students who enrolled in fall 1994, fall 1995, and fall 1996. The research findings from this study conducted at a single institution cannot be automatically presumed to be representative of all community colleges. However, this study has included substantial information about the institution, the characteristics and demographics of the students, and descriptive information about the enrollment and registration policies and procedures of the institution. Readers who may want to interpret these findings as they relate to another institution can utilize this information. With this caveat in mind, the following recommendations are presented.

Develop Systems for Collecting Data on Student Enrollment and Registration Behaviors

With the ubiquitous use of sophisticated computer systems on college campuses and appropriate database construction techniques, community colleges should expect the development of management information systems that can automatically collect enrollment and registration behavior data for later analyses. Computer hardware and software coupled with automated enrollment procedures can result in a data collection system that is transparent to the students, efficient for college staff, and provides a wealth of data for institutional researchers. Results from this study indicated that enrollment and registration behaviors could predict a significant amount of the variation in semester GPA, semester course completion, and attrition for the students investigated. These data should be collected and utilized to improve the students' education at the institution.

Utilize Student Enrollment and Registration Behaviors as Part of a Comprehensive Identification System

Once identified, students who engage in enrollment and registration behaviors that have been correlated with low semester GPA, low course completion rate, or high attrition can be targeted for early intervention services that provide additional support and academic assistance so students can achieve their educational goals. Results from this study indicated that several enrollment and registration behaviors are significantly associated with grade point average, course completion, and attrition. These specific enrollment and registration behaviors should be utilized as part of an early warning system for identifying students likely to have academic problems so that early intervention services and personnel can assist these students.

Make Community College Personnel Aware of the Association Between Enrollment and Registration Behaviors and Academic Outcomes

Properly trained, college staff can identify students whose records indicate enrollment and registration behaviors consistent with lower academic outcomes so that appropriate referrals and advice are given in a timely manner.

Make High School Staff Aware of the Association Between Enrollment and Registration Behaviors and Academic Outcomes

High school teachers and counselors can begin to sensitize students while they are still in high school of the types of behaviors that are associated with successful community college experiences as well as those associated with unsuccessful experiences. While there has been no cause and effect relationship identified in this study, the significant association between the variables can still suggest compelling reasons for attention to enrollment and registration behaviors.

Make Students Aware of the Association Between Enrollment and Registration Behaviors and Academic Outcomes

The behaviors associated with higher GPA, higher course completion, and persistence to the next semester should be discussed at orientation sessions and informal campus tours and visits. In addition, meetings with college counselors and academic advisors can be appropriate venues for the discussion of these behaviors with new students.

Examine Existing Institutional Policies and Procedures on Student Enrollment and Registration

Parameters such as length of registration period, length of add-drop period, number of course adds, drops, and section changes allowed, and when these changes are permissible might all be policy areas that impact directly or indirectly student behaviors. Individual community colleges should endeavor to recognize when their policies and procedures encourage behaviors that are associated with lower academic outcomes and change those polices and procedures.

Adopt Continuous Assessment of Enrollment and Registration Behaviors to Identify Trends and Patterns

These data can be utilized as part of an institutional strategy to provide the most effective policies and procedures that encourage student academic success. A regular analysis of these behaviors can provide one source of continuous feedback to community college officials on the effectiveness of their institutional policies and procedures related to enrollment. As data are identified that suggest that alterations in procedures might be necessary, these changes can be considered on a more timely basis with a continuous assessment process.

Recommendations for Further Study

This study investigated the relationship between enrollment and registration behaviors related to the fall academic semester with academic outcomes. Further research should be conducted to address the following.

1. This study was a quantitative study that did not consider the reasons behind the various enrollment and registration behaviors of students. A more detailed understanding of these behaviors would require a more qualitative approach to the research. In-depth profiles of students could provide a clearer understand of the reasons, intentions, and motivations behind the overt behaviors. Future research might investigate the reasons behind the enrollment and registration behaviors to determine the nature of their frequency and variation for different characteristics of students.

2. Prior research on variables similar to the enrollment and registration behaviors investigated in this study is very rare. Limited research has been conducted at the senior

institution and community college levels investigating the phenomena of late registration but these studies have been narrow in focus, ignoring student characteristics and other enrollment behaviors. Limited research has also been conducted on course schedule changes but these studies have only examined the frequency, reasons, and characteristics of students who make these changes without any examination of the relationship to academic outcomes. The extant research on student enrollment and registration behaviors fails to investigate the variety of behaviors in this area and the complexity of these variables in relation to student characteristics and academic outcomes. More baseline research needs to be conducted exploring the enrollment and registration behaviors of community college students to identify relationships, patterns, and associations between these behaviors and other areas of community colleges.

3. This study investigated the enrollment and registration behaviors related to the fall academic semester. Research needs to be conducted on these same behaviors for the spring academic semester to examine the enrollment and registration behaviors of students for that academic period. Additionally, a comparison of fall behaviors with spring behaviors could provide useful information related to academic outcomes.

4. This study investigated the enrollment and registration behaviors of first-time full-time community college students only. Research needs to be conducted that include part-time students and students that have previous matriculation histories at the community college studied. Information on the enrollment and registration behaviors of these students might also provide useful information to enable the institution to support those students as they pursue their educational goals and objectives.

5. This study investigated the enrollment and registration behaviors of a sample of community college students for only one academic semester. Research needs to be conducted that will investigate these same behaviors over a longer period of time to identify how the behaviors changes or remain the same for students. Longitudinal study of enrollment and registration behaviors could provide additional information about the association of these behaviors with academic outcomes.

6. This study investigated the relationship of the student characteristics, age, gender, ethnicity, academic intent, and financial aid eligibility with enrollment and registration behaviors. Research is needed to explore additional student characteristics such as high school academic performance, parental educational level, first generation college student status, frequency for changing academic major, and specific academic majors. Information on these additional characteristics could yield valuable information about the enrollment and registration behaviors and how these behaviors relate to students and academic outcomes.

7. This study examined the enrollment and registration behaviors of students at one small rural public community college in East-Central Illinois. Research needs to be conducted at other community colleges that are similar to this institution to determine if the results can be replicated. Research also needs to be conducted at other community colleges that are different than the institution in the present study to ascertain whether enrollment and registration behaviors of students and their ability to predict academic outcomes differ for larger institutions, urban institutions, or institutions with significantly different student characteristics.

8. This study examined the enrollment and registration behaviors of students at an institution with a specific set of registration policies and procedures that guided the process. It

was also an institution with automated telephone registration system and no Internet-accessible registration system for students. The length of the enrollment period and the add-drop period were considered to be very liberal, allowing students to drop classes up to the Friday before final examinations. Research needs to be conducted at institutions with both different student registration options and registration policies to determine how these factors impact registration and enrollment behaviors.

9. This study did not consider the numerous interaction variables that may exist between the various student characteristics and enrollment and registration behaviors investigated. Research that identifies these interaction variables and determines their relationship and association with academic outcomes is needed to better understand enrollment and registration behaviors. This research could also add to our understanding of community college students.

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APPENDIX A

LETTER OF AUTHORIZATION FOR STUDY